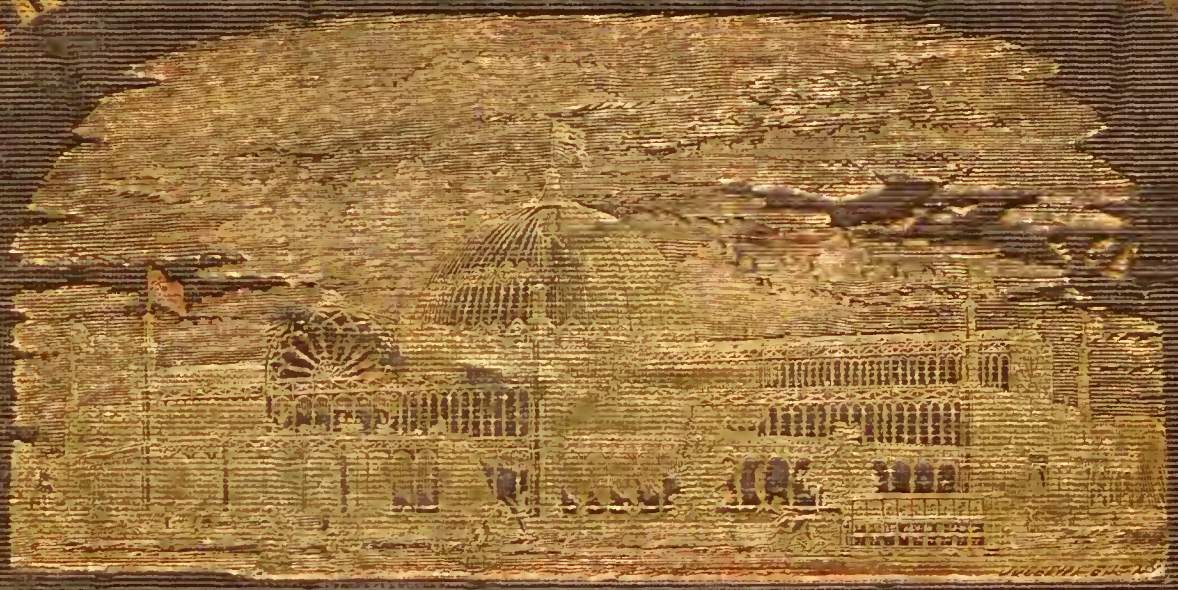
ILLUSTRATED DESCRIPTION

OF

THE NEW-YORK CRYSTAL PALACE



BY

GEO. CARSTENSEN & CHS. GILDEMEISTER

ARCHITECTS OF THE BUILDING

Furber, J. 1931.

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NEW YORK CRYSTAL PALACE

NEW YORK

Crystal Palace.

ILLUSTRATED

DESCRIPTION OF THE BUILDING.

BY

GEO. CARSTENSEN & CHS. GILDEMEISTER,

Architects of the Building.

WITH

AN OIL-COLOR EXTERIOR VIEW,

AND SIX LARGE PLATES CONTAINING PLANS, ELEVATIONS, SECTIONS, AND DETAILS, FROM THE WORKING DRAWINGS OF THE ARCHITECTS.

NEW YORK:

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TO THE

ARTISTS AND ARTISANS

OF

THE UNITED STATES

This Work

IS INSCRIBED

BY THEIR FELLOW-LABORERS,

CARSTENSEN & GILDEMEISTER.

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NEW YORK CRYSTAL PALACE.

INTRODUCTORY STATEMENT.

From the commencement of our professional connexion with the Crystal Palace, we conceived that it was due to the importance of an enterprise so national and extensive, that a technical and descriptive record of its origin, construction, and progress, should be placed before the public. It was our intention, however, in doing so to confine ourselves to a simple exposition of the details regarding the planning, designing, and construction of the building on Reservoir Square, treated in a purely technical manner, and addressed more particularly to our professional brethren. Circumstances have since occurred which render it necessary to preface it by a few remarks of an explanatory nature, unconnected with the technical portion of the work, and in vindication of our reputation.*

During the progress of the Crystal Palace, after its completion, and indeed up to a very late date, the public ear was filled with rumors—all of which tended to place us in a false light before the people. These injurious reports had none of the characteristics of the mistakes into which the public sometimes fall, and which almost immediately rectify themselves. There was a steadiness and persistency about them; a skilful and wilful misinterpretation of motives, and misstatement of facts, which rendered it evident at once that a secret and clandestine influence was being brought to bear against us. Numberless absurd rumors were set in motion, whispered from one to another, occasionally re-echoed by the press, and eventually, as is always the case, credited by many. Upon our shoulders was laid the blame for the numerous unnecessary delays complained of during the erection of the structure. To us was attributed the serious breach of promise to the public and exhibitors, by which the day of opening was postponed. It was at one time extensively rumored, and even mentioned

* It was our intention to have issued the present work long since; but the length of time required to get the plates engraved, and the increase of our professional duties, have unavoidably delayed its production until now.

in certain newspapers, that some of the girders and beams, when delivered, owing to an error in the drawings, were found to be too long, and that some of the columns, for a like reason, proved too short. This statement, we may observe, is utterly without foundation. In a building so extensive and so complicated in its nature, there must necessarily ensue some fitting, adjustment, etc., of its parts, but that any such result as that above mentioned took place is certainly untrue.

Next it was announced, that in consequence of our having delayed the completion of our working plans, the building would not be ready to receive goods for several months after the appointed date. Through the entire period of our connexion with the Crystal Palace, and up to the present moment, these injurious rumors remained wholly uncontradicted by us. During the course of our professional exertions we remained ever conscious of our own rectitude of purposes and honest fulfilment of our duty; and satisfied with this, we felt less regard than might be imagined for the circulation of calumnies, which were evidently conceived and circulated by interested persons. A time has, however, arrived when we may with great propriety give an unqualified contradiction to these injurious accusations; but while doing so, we disclaim entirely any feeling of animosity towards those who are responsible for these rumors.

In the plain, and we trust dispassionate statement of facts embraced in this Introduction, and in the correspondence between the Executive Committee and ourselves, which we publish in the shape of an Appendix, all that is necessary for the removal of any impression discreditable to us in our professional capacity will be found. While saving us the necessity of descending to the refutation of unworthy misrepresentations, this correspondence will afford the reader every opportunity of judging with whom originated in reality the many delays and errors which occurred during the erection of the Crystal Palace. It is our intention to pass over as rapidly as possible all details with which the public, through the medium of the press, may be supposed to be already familiar, and the *ex parte* statements of the Executive Committee.

Everybody must be aware of the motives which prompted the erection of a Crystal Palace in New York for the purpose of an Exhibition of the Industry of all Nations. The astonishing success which attended the original enterprise undertaken in London in the year 1851; the eagerness with which the example was followed by various countries that signified their intention of immediately entering upon a similar undertaking—all rendered it necessary that so grand a nation as America should in its turn realize on her own soil this novel idea of our progressive era. In this

country such an undertaking would not expect or require the assistance of the State, as is the case on the continent of Europe—even our very Constitution prevented the Federal or State Governments from rendering any direct aid; therefore it was left to private enterprise to complete a task which elsewhere required royal exertion to insure its success.

A charter having been granted by the Legislature of New York, incorporating an Association for the Exhibition of the Industry of all Nations, a Committee having been organized, and a lease of Reservoir Square at a nominal rent having been procured from the city government, it was announced that the furnishing of a design for the contemplated building was open to competition. The circumstance of our becoming competitors was purely accidental. We did not know of the lists being open until about three weeks before the final arrangement, when, at the suggestion of our friends, we undertook the task of furnishing a design worthy of the occasion (Appendix I.). Previous to the acceptance of our plan by the Board of Directors, the latter entertained exceedingly restricted ideas regarding the limits of the future enterprise. The company was limited in its means; both at home and abroad a feeling of distrust was manifested towards what was considered to be a private speculation rather than a national undertaking, and European states were cautious in giving any promises of co-operation. The Committee, therefore, thought it advisable to restrict their expenditure for the edifice to the sum of $175,000, and to content themselves with a one-story building, which should embrace as much as possible of the ground allotted to them on Reservoir Square. If the reader refers to our correspondence with the Board on this subject it will be seen that we foresaw the necessity of providing more space than that originally contemplated (Appendix II.). An illustration of the correctness of our views may be found in the fact that although the building designed by us contained (in the shape of galleries) 62,000 square feet more than they imagined would be required, it was found necessary to erect an extra building, in order to contain a machine-arcade and picture gallery, at the sacrifice of much important time; at the risk of serious injury to the symmetry of the principal edifice. In the illustrations which we furnish of various modifications of our original design (Plate II., Fig. 3) made to suit the need of the Company, it will be observed that we at first proposed a basement story, which, if carried out, would have given an additional surface of 150,000 square feet, for about the same sum as was afterwards expended on the erection of the somewhat unsightly machine arcade. The prudence of the Board of Directors went even so far in point of economy as to suggest the abolition of galleries altogether. Independently of the

artistic incompleteness which would have pervaded an entirely naked shed, such as the Palace would have become had this suggestion been adopted, those who visited the Exhibition after its opening, and observed the crowded effect of many of its departments, will at once perceive how very inadequate the building would have been to meet its practical purpose without those galleries. Had our original plan been adopted in its totality, some serious defects that now exist would have been entirely avoided. The presence of a basement story would have elevated the building about six feet, thus decreasing the unfavorable effect which the heavy masonry of the Reservoir now produces upon it. But so depressed was the feeling of some members of the Executive, that it was at two different periods suggested to have, instead of a lofty and aerial dome which should give dignity and elegance to the whole structure, an open court in the centre, roofed in with canvas. Even the unprofessional reader can easily realize the effect of so flat and ungainly an edifice, when so closely contrasted with the huge proportions of the Reservoir.

Our plan having met with the approbation of the Board of Directors, and those alterations having been carried out which the smallness of capital of the Company rendered unavoidable, our contract was signed on the 26th August, 1852, after which the mechanical departments were called into action. The contracts for the masonry were given out on the 4th of September, and on the 25th of the same month the iron work was contracted for. It was stipulated that the foundation should be ready, and the first necessary castings delivered, on the 21st of October. A pattern shop was established in this city, under the superintendence of Messrs. Ch. J. Shepard and John Purvis, and the contracts for iron were distributed among various manufacturers, some in New York City and State; others in New Jersey, Pennsylvania, Delaware, and Connecticut. This distribution of the iron contracts, owing to the failure in making arrangements for the whole supply from any one or two houses in this city, was the occasion afterwards of much inconvenience and disappointment, as will be shown in the course of our statement.

The first column of the Crystal Palace was erected with appropriate ceremonies on the 30th of October, 1852, and simultaneously with this first active step to the erection of the building, the delays and negligentfulness, afterwards the source of so much complaint, seemed to spring into existence, for even on the 24th of November nothing but that single column had been raised.

In all great undertakings the projectors should evince a corresponding spirit. To cramp the mechanical agents of an enterprise is to insure its

failure; and to attempt to compass certain ends with inadequate means is an almost certain path to disappointment and ridicule. The opening of the Crystal Palace was fixed for the first of May, 1853. During the first few months that followed the raising of the first column the public had great confidence in the punctual fulfilment of this promise. They had seen with what energy and punctuality the contracts of Messrs. Fox & Henderson had been accomplished in London. The monthly intelligence of the rapid progress of the Exhibition building in the Irish capital cheered them with the hope that all difficulties would be overcome here by the well known spirit and energy for which Americans are so justly celebrated; and people predicted proudly that, in spite of all constitutional and other obstacles, the New York Crystal Palace would throw open its portals at the appointed time, and welcome within its aisles the congregated labor of the world. But as time rolled on this hope became less buoyant. Those who visited the scene of operations, and they were many, beheld even in the month of January a dismal sight in regard to the progress of the building, notwithstanding the skilful, thorough, simple, and practical method applied in raising this structure, for which task Messrs. Noe & Marshall deserve all the credit due to able and courageous men.

The dispiriting effect of such a state of things made itself manifest in the press, and complaints and accusations of dilatoriness and neglect poured in upon the Direction from all sides. By what means a change in the tenor and aim of these attacks was effected we have not to this day been able to discover; for they were almost all suddenly directed against us, the architects, —not the authorized superintendents of the Crystal Palace; and we found ourselves arraigned before the tribunal of public opinion as the parties guilty of, and responsible for, all the evils. We are not disposed to deny that delays did occur, but we feel confident that the facts hereinafter embodied will refute the accusation, so freely circulated, that *we* were the cause of them, and even show that we were destitute of that authority necessary to counteract them.* Our pecuniary supplies were inadequate to the proper conduct of our task. The time afforded us for the accomplishment of our undertaking was indeed limited when compared with the vastness of the work, and a judicious expenditure of funds was obviously the only way to conquer the difficulties that presented themselves. In our estimate of the remuneration we ought to receive we confined ourselves to

* To prove our willingness to further the erection of the building we advised the Executive to engage Mr. Julius Kroehl, engineer, who was one of our best assistants, for the purpose of taking charge of the structure, in which arrangement they succeeded, and from that time, the beginning of February, it may be said that the actual progress of the building commenced.

the lowest possible sum. We took into consideration that this was a private enterprise, unsupported by government, and consequently less able to afford a large compensation. We therefore, as will be seen in the correspondence, demanded the sum of $5000 for our design, working drawings, specifications, etc. (Appendix IV., V., XIII., XIV., XV.) In addition to the laborious task of furnishing all these items for the building, we were, in consequence of the inefficiency of certain officials connected with the engineering department, compelled to superintend portions of the work which were entirely beyond our strict sphere, which we had no official authority to control, and which consequently could not entail upon us any responsibility.

We superintended the surveying of the ground, the excavation for the foundation, and the foundation-work itself. We also inspected the execution of the work in the pattern shop and the iron-works, many of them being situated several miles apart, the visiting of which not alone entailed loss of valuable time, but considerable extra expenses. At the same time we had to furnish working drawings for every detail of the construction, according to our plans, with the necessary specifications, besides drawings for stained glass in the fan-lights, dome-windows, and numerous other items, which were not made use of because too expensive, and which required a great deal of time-wasting conferences with the respective establishments in the city. Nor did our task cease here, for we had to explain these drawings to nearly all the competitors for the contracts for different portions of the work, and when we state that from three to four hundred different designs were made, requiring on an average three explanations each, we think that our professional brethren, to whom we address ourselves particularly, and even the public in general, must come to the conclusion that we certainly earned the $4000 which we received as a remuneration for the fulfilment of our duties.

An additional sum was granted on the 30th November, 1852, to meet expenses for assistants and office outlays, caused by the division of the work among numerous parties, which considerably increased the number of drawings, specifications, etc. This sum finally amounted to $2630, for which we gave a specified account with vouchers to the Board of Directors. At that time it was already difficult to induce assistants of sufficient ability to accept a situation for a short period, while the contrary would have been the case if we had been enabled to offer them an occupation from the 1st of September.

So far from being negligent or dilatory it will be seen that, cramped as were our pecuniary means, we absolutely assumed the duties of the working officials in addition to our own, and superintended portions of the enterprise

which, according to what has already been stated, we had not contemplated as devolving upon us.

With regard to those duties which were strictly ours, we do not hesitate to assert that they were punctually performed. If anybody has a right to complain it is ourselves, who on almost every occasion experienced considerable difficulties in getting our designs practically carried out with quickness.

Immediately after the idea of the Crystal Palace was matured, a pattern shop, as above mentioned, was established expressly for making the necessary patterns for the iron castings to be used in the building. This establishment was abundantly provided with mechanics, and it became of course a matter of economical necessity to keep them continually supplied with designs from which to construct their patterns for the cast-iron work. In obedience to this necessity we furnished these drawings so rapidly that numbers of them remained undisposed of for some weeks and months, either because the workmen were over supplied, or from some defect in the system on which the establishment was conducted. The effect of this arrangement was, however, soon seriously felt. The undivided attention which was given to the cast-iron work interfered so much with the progress of the wrought-iron work, that it was almost entirely laid aside, and although constituting a very essential part of the building, such as the dome, the trusses supporting the same, the roofs, galleries, staircases, etc., it was almost entirely neglected at a period when it should have commanded the principal attention of the Superintending Engineer.

One of the chief causes of the delays so frequently complained of was the dilatoriness with which the iron materials for the building were delivered. Shortly after the contracts were made the prices of iron were increased, and the contractors appeared unwilling to purchase and deliver at a higher rate than they themselves were to receive according to the terms of the contract. Not having been intrusted by the Board of Directors with the contracting department, we took no part in the giving out of contracts, and had no power to enforce their fulfilment. By the shortcoming of contractors and failure of the Executive to hold them to their obligations, we were reduced to the most lamentable expedients to get materials together; we had to search from store to store for angle iron, making what use we best could of such pieces as we were able to procure in this desultory manner, completely reversing the usual order of such matters, and constructing our building with reference to the materials, instead of getting those which would suit our construction. As a signal and eloquent instance of the want of system which pervaded the entire working corps, we may state that the castings for the second story of the

building were delivered on the ground a considerable time before those required for the first story were even ready.

Much of the trouble experienced in these matters might have been avoided if the Board of Directors had entertained juster views of the true position of superintending architects, and allowed us the directional power which belongs to that department. As it was, our sphere of action was exceedingly ill defined. Our duties and responsibility frequently clashed with those of the superintending engineer. At times this official prevented action on our part in what he designated as his province; at others, he silently relied on our doing things of exactly similar nature which we had abstained from out of respect to his previous intimations; and still, again, he interfered with work properly and clearly belonging to our department, and for which we ostensibly remained responsible, while it was executed in a manner contrary to our ideas, and to the plans furnished by us. The following instances will afford sufficient example:

Shortly after the palace became roofed, the leakage which occurred was a matter of serious inconvenience and annoyance. If the reader will refer to that part of our technical description which regards the gutters and louvres, he will find that we furnished designs, and made suggestions for those parts of the building, which, had they been adopted, would undoubtedly have precluded such a result as leakage. Another plan for gutters was, however, put into execution, suggested by other parties. The end obtained by this alteration from the original plan did not prove to be quite so satisfactory as the directors had anticipated.

In regard to the awnings placed over the louvres to prevent the leakage through them, we object to them for the following reasons: 1. That they spoil the appearance of the building, and prevent proper ventilation: 2. That they have cost too much in time and expense: 3. That they did not fulfil their purpose, which was proved by the first heavy shower. Besides we feel convinced that after becoming decayed, they will be torn into shreds, and thus injure the appearance of the building.

Most of the outside pannels are made of sheet, instead of cast-iron, for which latter material we had furnished the necessary drawings, and several patterns as well as castings had been executed accordingly; but as they were considered too heavy and expensive by the superintending Engineer, we consented to the substitution with the express understanding that the ornamental mouldings should be affixed to them, which has not been done, giving those pannels over the different roofs, and below the cornice of the dome, a rather plain, and, in some instances, a deformed appearance.

Other circumstances of a similar character will be found at their proper place in the technical description.

Having given a few instances of the interference of the Executive with our department, we shall next show some of the causes of delay.

The superintending Engineer had, it seemed, conceived some novel ideas for the construction of the dome, and went so far as to test one of his schemes by practical experiments. A couple of months were wasted in these unsuccessful trials. After a great deal of delay, caused entirely by such procrastination and fruitless experiments, the before mentioned gentleman suddenly conceived that it was a matter of impossibility to construct the dome with the necessary celerity in this country. He therefore suggested the idea of sending our design to England, and have that portion of the building executed there. At this period, however, we determined as much as possible to take the matter into our own hands, and could not for a moment think of permitting it to be said, that in order to construct an American Crystal Palace we were obliged to rely on English workmanship for the most important part of the structure. We therefore, by our own personal exertions, succeeded at the eleventh hour in getting a sufficient quantity of iron together, which might have been obtained at an earlier period, and with much less expense and trouble.

The finishing of the working drawings for the dome-ribs was delayed in consequence of the superintending Engineer not securing iron in proper time, as, for reasons above stated, we had to make our constructions according to the iron found in the market. After succeeding, thanks to our own efforts and the energy of the assistant engineer, Mr. KROEHL (under whose superintendence the dome was erected), in obtaining a sufficient quantity, we finished our designs for the same; which afterwards lay idle for nearly a fortnight.

The drawings for the wrought-iron girders supporting the dome, were finished on December 24th, 1852, and the contract for one-half of them was given to MESSRS. MOTT and AYRES on January 15th, 1853; the other half of them was manufactured by MESSRS. HOGG & DELAMATER, who deserve great credit for their execution of the dome ribs; but they did not, we believe, receive the order for them before the middle of February. Even the outside ribs of the dome were ready, with the necessary bolts for securing them, before the opening of the Exhibition; but the assistant Engineer was prevented by the Executive from putting them in their proper places, so that the building may be said to be yet unfinished. We trust that the Board of Directors and the present efficient superintendent, Mr. J. MONTGOMERY BATCHELDER, will give it the last finish, before it shall

meet the eyes of myriads of visitors that the coming season will bring to this metropolis.

As a further proof that the want of working drawings did not cause the delay, we beg to state that Mr. KAY commenced on the 12th of January, 1853, to draw a section (Pl. I.) of the building according to them, and completed it within a month.

Again, we got no official order to build the extra machine arcade and picture gallery before the month of March, as will be seen by referring to our correspondence with the Board (Appendix XIII.). This building would have been rendered entirely unnecessary, as above explained, had the plan of a basement, which we furnished in our original plan, been carried out. This would have afforded all necessary space for machinery, &c., and would have saved much delay and inconvenience. Even in the erection of this simple arcade, we experienced the same kind of obstructions which we encountered in connexion with the main building, occasioned partly by the want of foresight or unanimity in some of the superintendents of the different departments.* The gentleman who had the superintendence of the machinery department, Mr. HOLMES, did not inform us of the dimensions of the engines intended to be placed in the building, until the latter was nearly completed, when it was discovered that a beam engine, which was to occupy a certain portion of the shed, would require a loftier roof than that which our design allowed; we therefore had to elevate that portion of the building at that late moment in order to provide for the exigencies of the machine.

Such are the simple facts of the history of the erection of the Palace. They exhibit the true causes of the mistakes and delays which occurred during the construction, and they cannot fail to exonerate us from any blame to all unbiased minds.

It now only remains for us to speak of the decoration and interior ornamentation. Before doing so, however, we may be allowed to offer a few remarks on the position which an architect should occupy in relation to his works. Architecture is an art by which the social necessities of mankind are completely bounded. It is applicable at once to the most divine and domestic uses, and is equally used in sheltering the peasant and in worshipping God. The professor of an art so extensive, so useful, and so sublime, must in a very great degree partake of the nature of his pursuit,

* Speaking of superintendents, we think it our duty to mention that Mr. THOMAS H. FARREN was appointed at the end of May, 1853, superintending Engineer of the additional building and that we cannot pass here without thanking him for the energy and gentlemanly conduct he displayed during our connexion with him.

and possess a mind trained to grasp an infinite number of details, and comprehend them in combination as well as unity. If he has studied his profession lovingly, his mind is not confined to mere outline of form, but dwells equally upon every accessory which can be enlisted for the decoration of that form. In buildings of a certain character there is an after process which is quite as important to their general effect as the fitness or beauty of the architect's design—we mean the application of decorative color. This species of ornamentation is equally powerful in heightening or marring the beauty of the building to which it is applicable. Certain colors on certain points cause them to project or to recede—to appear straight or curved. By color, light and shade can be given and assisted, and a building invested with a harmony which none but those who have seen the art in its perfection can realize. Considering the important part which chromatic decoration plays in those buildings to which it is applied, it becomes a matter of consideration as to who is the most competent person to direct the application. At first sight one would say the professional decorative artist. This is quite right, if one can always find a decorative artist who has studied the subject æsthetically; but nevertheless there is another person who, we think, should always play an important part in the decoration of buildings—we mean the architect. W. J. Hayter Lewis, in a lecture read before the Royal Institute of British Architects, London, on the construction and decoration of the Royal Panopticon Institution, makes the following sensible remarks on this subject:—

"The western part, which is chiefly arranged for private houses, separate from the Institution, was carried up first. The interior allowed of more time for thought, so I cannot plead haste as an excuse; and for whatever faults there may appear in it I feel that I am fully responsible. I ought also to say that I had the advantage of working with a council, and a body of officers, who, whilst looking very carefully after the interest of the Institution, allowed me great latitude in carrying out my ideas, and gave me as complete a control as was practicable over every arrangement. There was also a member of our profession, Mr. Marrable, on the committee, from whom I received not only the kindest attention, but many very valuable hints. There were no decorators brought in to heighten or spoil, as the case might be, the architect's general design; but every question connected with the building was submitted to me, and my recommendations were received in a very liberal spirit. I do not, however, mean to claim the merit of all the details of the decoration. The paintings on the soffites of the dome arches, and on the ceilings (and these are, I believe, the only parts not designed by me), were worked out by Mr. Fisher (of the firm of

Harland and Fisher), who, I think, deserves great credit both for design and execution. But it was left to the architect to say what decoration he required, of what character, and of what depth of color. Young as I am, I feel sure that, unless this course be acted upon, and the architect left to work out the whole of the design, it will be quite vain to expect uniformity and completeness in the general effect. I wish to mention here, that I speak only of myself in this matter, because my partner, Mr. Finden, taking a different department of our business, left the whole management of it to me."

It must be perfectly evident to every one who thinks upon the matter, that the person who ought to have the most harmonious idea of a building, is the person who designed it; and that to intrust a department exercising so powerful an effect upon the whole as the decorative one, into the hands of some one whose opinion may be opposed to that of the architect, is to risk the destruction of all beauty in the building. The architect should always be a decorative artist. His task is but half completed when the structure is erected. From him, and from him alone, should emanate the rich masses of color, positive or low toned—strengthening this, subduing that—leading the eye to certain points, giving solidity to others—and casting over all what Mr. Owen Jones so admirably calls "a neutralized bloom," which shall neither fatigue nor distract the eye of the spectator, yet at the same time bring out with distinctness the design and character of the building.

Holding these opinions, we addressed to the Board the letters which can be seen in the Appendix.

We cannot omit here to remark that the unsightly appearance of the stoves, with their pipes carried through the whole height of the building, which are employed by the Executive for heating the same, would have been avoided if necessary provisions according to our suggestions had been made in proper time (Appendix I.). Nor have we had any part whatever in the distribution of space, or in the decorations of the different departments with their contents. We have only directed the exhibition of Thorwaldsen's statues of *Our Saviour and the Twelve Apostles*, with the baptismal font, which was one of the few departments entirely completed at the opening of the exhibition.

For the decoration of the dome we had devised two designs, besides the one described in the letter in Appendix XVII. The first was for the ground a rich blue with gilt or silver stars in relief. The second was as follows:—From the apex of the dome a cluster of silver rays were to radiate down to about a third of its depth, giving the effect of light bursting

in through an aperture above. The remaining two-thirds of the dome were to have been colored in alternate subdued red and white stripes, over which a network was stretched, giving the effect of a huge American ensign having been cast over the dome, and supported in its place by the ribs and the net-work, which would seem to bulge and droop beneath the superincumbent weight. Without wishing to insist upon the superiority of either of these designs over the one adopted, and executed by Mr. Monte Lilla, under the superintendence of Mr. Greenough, we cannot refrain from adverting to the defects of the latter, where the apex or receding point of the dome was painted yellow, which is the most advancing color in the spectrum, and the base or nearest point a light blue, which is the color always used to bestow the effect of a receding object. The consequence was that the dome lost a third of its apparent size by this distribution of colors. The yellow brings the top nearer to the spectators, while the blue gives to the base the effect of distance, and the vault which should have looked light, aerial, and expansive, has now been flattened down. We at one time understood that a gentleman from England, Mr. Mould, a pupil of Mr. Owen Jones, offered some meritorious designs for the decoration of the building,* which were not accepted. We had not the pleasure to see these designs until seven months after the Crystal Palace was opened, but we think that in a matter so important as the decoration of a building which we designed, it was the duty of the Executive to permit us to have a voice in the affair; a just courtesy which was never granted. On the whole we trust that the reader, after a perusal of this statement, and the accompanying correspondence, will see that whatever mistakes may have occurred during the erection, and in the completion of the Crystal Palace, they are not attributable to us.

We are satisfied to rest our case on these facts. Our object being merely to refute unfounded attacks upon us, it is not our purpose to demonstrate the real sources of the dissatisfaction of the public. We write to exculpate ourselves, not to inculpate others.

Having now concluded what we very unwillingly have been forced to make, a somewhat egotistical statement, we cannot bring our labor to an end without expressing our obligations to those gentlemen who were employed in our department, and among whom we have particular pleasure in mentioning Messrs. Kroehl, O. Diez, A. Bauer, J. Kay, and A. Monte Lilla. As for ourselves we have not received any advice from those

* Several months before the decoration of the Palace was taken in contemplation by the Board we had forwarded to Mr. Baxter, of London, our design for the exterior. This design will be found at the beginning of our work.

gentlemen who were engaged in the superintending or consulting department, especially as we never were honored with any kind of private or official conference with the latter. To Messrs. Fox & Henderson we are indebted for the system of columns and girders. For the main construction of the rest of the building, its excellences or defects, we alone are responsible.

We do not make this address because we have wrongs to redress, but because there are false impressions to be removed, and having from a feeling of what we owe to ourselves endeavored to set the matter right with the public, we shall, without further comment, respectfully leave it in their hands.

G. Carstensen & C. Gildemeister,
Architects of the New York Crystal Palace.

New York, *February* 14, 1854.

GENERAL DESCRIPTION OF THE BUILDING.

The materials used in the construction are mainly iron and glass,—wood only being employed in the floors, doors, and sashes.

The plan will be readily understood by the plates. The central part is surmounted by the dome, 71 feet from the floor to the spring of the arch, which rests on 24 columns, 16 of which form two concentric regular octagons, the one inscribed within, the other circumscribed outside a circle of 100 feet diameter; the distance of the columns in the latter, 41 feet 5 inches, thus determines the width of 4 naves, radiating from the centre, and carried up to a height of 67 feet from the ground floor to the ridge of the roof. On each side of the naves the aisles extend to the same length, each 54 feet wide, and carried through 2 stories to a height of 50 feet from the first floor to the highest point of the ceiling. The naves with the aisles form in this manner a Greek cross, over the centre of which the dome rises, and the spaces in the exterior angles of the cross are fitted up with triangular lean-tos, one story 24 feet high, giving to the ground plan on the first floor the form of a nearly regular octagon, at each angle of which an octagonal tower of 8 feet diameter rises to a height of 71 feet.

The whole space thus inclosed, with the exception of the central part under the dome, and the 4 naves, is divided by columns 27 feet apart from their centres into square and triangular compartments or bays, as shown on the ground-plan. On three sides of the building project entrance halls corresponding in width with the naves, and 27 feet deep, with offices attached to each side, 27 feet wide by 18 deep, and subdivided into two stories, the upper ones being accessible from the platforms of the adjoining staircases in the main building. The fourth side, situated towards the Croton Reservoir, is left without an entrance.

The second story extends over the aisles, and over two bays of each nave, thus forming an uninterrupted gallery of 54 feet width around the whole building, and accessible from all parts of the structure by 12 large staircases, 4 of which are placed under the dome, and 8 at the ends of the aisles near the entrance halls; 8 winding stairs in the towers facilitate the communication between both stories for the officers of the Association.

Three large balconies over the entrance halls and offices are approached from the galleries. The building presents 3 principal fronts to the three

streets which inclose it, the architecture of which is sufficiently shown in the accompanying plates.

After the original plan had been adopted, and the structure commenced, it was found necessary to furnish additional space, for which purpose the machine arcade was attached to the eastern side of the building. The space between the latter and the Croton Reservoir was thereby nearly filled up, a narrow passage of 5 feet width only being left according to the requisition of the Croton Department. The length of this arcade is 451 feet 5 inches, its greatest width 75 feet, and that of the two story building 21 feet; the first story is partly of the same height as in the main building, the lower parts or sheds are from 13 feet 4 inches to 16 feet 4 inches high, and the second story which connects with the galleries of the main building, and forms a picture gallery, with a skylight extending almost its entire length, is 18 feet 9 inches high without the skylight, which rises 5 feet 6 inches higher.

I. FOUNDATIONS.

The foundations were started 2 feet 6 inches below the ground, on a base-course of large stones, respectively 5 and 4 feet wide, and 8 inches thick, diminishing in thickness as they approach the surface, from which point the walls are built perpendicularly of blue building stone, all laid in lime and sand mortar, and covered with a coping 5 inches thick, and from 1 foot 6 inches to 2 feet wide. In consequence of the grade of ground this coping is, on the eastern side, near the Croton Reservoir, laid immediately above the surface of the ground, whereas on the part facing the 6th Avenue it is placed on walls carried up to a height of about 7 feet. The columns in the interior rest on isolated piers, built in the same manner, and covered with granite caps; those columns which stand in pairs having a common pier for support. Before the coping and granite caps were laid, the upper surface of the masonry was carefully levelled, and before the iron structure was raised, the same process was repeated, and also the centres for each column marked on the stones. Drains from different parts of the building to receive the rain-water from the roofs through the hollow columns were built at the same time, of brick laid in hydraulic cement, discharging into the street sewers.

II. COLUMNS.

The columns employed are of two different thicknesses. Those of 8 inches

diameter (Pl. III., Fig. 1) are of an octagonal section with circular bore, and support the main part of the construction. The others are four inches in diameter. Some of an octagonal section are employed in the towers, and to support the stairs; others of a section as shown on Pl. III., Fig. 13, *a a*, are employed in the inclosure of the building, showing to the outside half an octagon, to the inside half a square with chamfered corners. A third kind, forming the corners of the towers, is of an octagonal section with two flanges to receive the plates forming the inclosure, Pl. V., Fig. 7.

A. 8-INCH COLUMNS.

They consist, according to the height of the different parts of the building, of several pieces connected by screw-bolts. Those in the first story, 190 in number, Pl. III., Fig. 1, are composed of three distinct parts: A the base piece, consisting of a base-plate $1\frac{1}{2}$ feet square and $1\frac{1}{2}$ inches in thickness, and a shaft of the same section as that of the column, connected with the plate by 4 strengthening ribs. The top extends to four lugs of $2\frac{1}{2}$ inches in thickness, with holes corresponding with those of the shaft of the column, by which both parts are bolted together. The centres of the screw holes are uniformly $5\frac{1}{2}$ inches from the centre of the column, and $1\frac{1}{4}$ inches from the outside of the lug. The whole height of the base-pieces is 4 feet $6\frac{1}{2}$ inches, and they rest on the coping of the foundation walls and piers of masonry, which are carried up to a height of $9\frac{1}{4}$ inches under the floor. As the columns under the dome are arranged in pairs, their base-pieces are united by a separate bed-plate, to which they are fastened by four $1\frac{1}{2}$ inch bolts and two keys. Pl. III., Fig. 7*, shows the plan and elevation of those base-pieces, also indicating the different positions of the lugs. Pl. III., Fig. 2 shows the base-pieces, with outlet pipes for the rain-water, which is conveyed through the columns. As their number was found insufficient, a portion of the other base-pieces were afterwards provided with lead outlet pipes. The thickness of metal in the base-pieces varies according to the weight supported by them. Those under the dome, 24 in number, are $1\frac{1}{2}$ inches in thickness; 60 supporting the naves, and in the centre of the 8 towers, of which 30 are cast with outlet pipes $\frac{5}{16}$ of an inch; 64 supporting the aisles, of which 8 have outlet pipes $\frac{3}{4}$ inch; and 42 under the lower parts of the building, 4 of which have outlet pipes, $\frac{5}{8}$ inch.

The shafts of the columns (Pl. III., Fig. 1 B) through the first story are 16 feet $4\frac{1}{16}$ inch long, of the above described section, and have lugs on

* Pl. III., Fig. 7, 8, 9 are drawn to a scale of $\frac{1}{4}$ of an inch to the foot, instead of $\frac{1}{2}$ of an inch to the foot, as erroneously marked on the plate.

both ends to form the connection with the base-pieces and connecting-pieces. The lugs at the bottom end, four to each shaft, correspond with those of the base-pieces at the top end; some columns have four, others three lugs, corresponding with those of the connecting pieces, as specified at another place.

The shafts of columns vary in thickness of metal as the base-pieces, the corresponding numbers being $1\frac{1}{4}$, $\frac{13}{16}$, $\frac{5}{8}$, and $\frac{1}{2}$ inch thick; the bolts corresponding with each thickness are of $1\frac{1}{4}$, $1\frac{1}{8}$, 1 and $\frac{7}{8}$ inch diameter.

A separate piece connects the columns of the different stories with each other, as well as the columns to the girders, and is therefore appropriately called "connecting-piece;" it is shown on Pl. III., Fig. 1 C C^{I} to C^{IV}. At the top and bottom end of each piece, snugs project $3\frac{1}{3}$ inches from the sides of the octagon, to receive the girders between them: the space between these snugs is 3 feet $\frac{1}{4}$ inch in the clear, $\frac{1}{4}$ inch more than the height of the girders. The number of these snugs depends on the number of girders that each connecting piece has to receive, from which, and from the angle at which the girders are placed, the different arrangement of the snugs shown in the figure result. The lugs for the connection with the shafts of the columns are placed between those snugs, as may also be seen in the figure. The connecting pieces of the dome-columns are each pair firmly united by cast-iron cross-braces, screwed to projections at the connecting piece, formed for this purpose, Pl. III., Fig. 8. In each pair, one connecting piece only is provided with snugs, as no girder is attached to the other. It will be seen in the ground-plan of the building, that at each intersection of the aisles, 2 columns are placed near together, their distance being 3 feet $2\frac{29}{32}$ inch from centre to centre. Their connecting pieces are united by similar cross-braces. The whole height of the connecting pieces is 3 feet $4\frac{5}{8}$ inches, thus making the first story 24 feet $3\frac{13}{16}$ inches high.

The shafts of the columns of the second story are of the same thickness as those of the first story, and 17 feet $7\frac{1}{2}$ inches long. Of the first thickness, 16 have four lugs at the top and bottom; of the second thickness, 8 columns have four lugs at the top and bottom, and 8 columns 4 lugs at the top and three at the bottom; of the third thickness, there are 76 with 4 lugs at the top and bottom, and of the fourth thickness, 32 with four lugs at the top and 3 at the bottom.

The connecting pieces of this story correspond in thickness with their columns, and are of the same height as those of the first story. 40 of them are cast with brackets to receive the arches over the nave (Pl. III., Fig. 9). Of the second thickness there are 8 like C^{III}, and 8 like C^{III} with shoulders for braces; of the third thickness, 44 are like C^{I}, and 32 like Pl. III.,

Fig. 9; and of the fourth thickness, 32 are like C. The total height of the second story is 21 feet $\frac{1}{8}$ inch. The third story columns are only of three different thicknesses, viz. 24. Of the second under the dome connected in pairs by cross-braces, with top and bottom lugs, the snugs of 8 of their connecting pieces are as shown in Fig. 2, C^{III}, the rest are as in the lower stories. The columns of the other thicknesses have 4 lugs at the bottom, but none at the top. Of the third thickness there are 8 columns, their connecting pieces having only one pair of snugs; of the fourth thickness, 32 columns with two pairs of snugs. The total height of the third story columns is 15 feet 6 inches.

B. 4-INCH COLUMNS.

These are of semi-octagonal shape (Pl. III., Fig. 13), and are employed in the inclosure of the first, second, and third stories, between the 8-inch columns, the part formed to an octagon facing towards the outside of the building. Their thickness of metal is $\frac{1}{2}$ inch. In the first story, 122 of them are placed, consisting of a base-piece, shaft, and connecting piece. The base-piece has a base-plate 9 inches square, $\frac{3}{4}$ inch thick, with four strengthening ribs extending upwards 7 inches (Pl. VI., Fig. 4, at *a a*). On the top they have a flange $6\frac{1}{2}$ inches in diameter, with three holes for $\frac{5}{8}$ bolts. The height of these base-pieces is 4 feet 6 inches, their number 122.

The shafts of these columns are of the same shape (Pl. VI., Fig. 4 at *a a*), and 16 feet 6 inches long, with a flange 8 inches in diameter at the bottom, and $7\frac{1}{2}$ inches diameter at the top; both flanges being 1 inch thick. Their connecting pieces, 3 feet 2 inches high (Pl. VI., Fig. 4 at C C), have 5 inches in diameter, and are provided with top and bottom flanges $7\frac{1}{2}$ inches in diameter, and 1 inch thick; the distance between the flanges being 3 feet in the clear, corresponding with the height of the girders, 14 of them cast together with parts of the girders at the outside; 6 are 4 inches in diameter, and 16 form standards in the wrought-iron girders which will be described hereafter. The entire height of the 1st story, 4-inch columns, is 24 feet 2 inches.

In the second story, the columns consist of shafts and 5-inch connecting pieces of the same shape and height as those of the lower story. The shafts vary a little in length; those placed on the trellis girders differing from those connected with the lower story 4-inch columns. The columns around the galleries have chairs attached to receive the inverted trusses of the gallery floors. In all there are 64 columns with chairs like Pl. III., Fig. 13, and 12 without chairs, having round top and oblong bottom flanges, 17 feet

11⅝ inch long, with 5 inches connecting-pieces 3 feet 2 inches in length; making a total length of 15 feet 4¾ inches. All these shafts have round flanges at the top, and oblong ones at the bottom. The rest of the 4-inch columns will be included in the description of the stairs and towers.

III. GIRDERS.

The girders employed are partly of cast, and partly of wrought iron.

A. CAST-IRON GIRDERS.

These may be divided into trellis girders supporting the galleries and roofs—and outside girders as forming part of the inclosure, ring-girders in the first and diamond-girders in the other stories. The trellis-girders (Pl. III., Fig. 3) are 3 feet in height, and vary in length according to the distances between the columns. They have small projections at each end which fit between the snugs of the connecting pieces, and are fastened to them by keys. At the bottom, small keys or tandems are cast to them, while, at the top, key seats are cut into them, corresponding to those in the snugs. Pl. IV., Fig. 1 shows the mode of connexion of the girder with the column. The trellis girders differ in their sections according to the weight they have to support. These sections are shown at Pl. III., Fig. 3, the letters corresponding with those in the elevation. Each girder is 8¼ inches shorter than the distance between the centres of the columns to which it is attached. The first story is spanned by 176 girders 26 feet 3¾ inches long, 16, 24 feet ¼ inch long, of heavy sections as they support the galleries. Of light sections, there are 48, 26 feet 3¾ inches long, supporting the roofs over the lean-tos. 8 girders, 20 feet ¼ inch long, connect the columns under the dome, as seen in the ground plan (Pl. II., Fig. 2 *c*), 6 of 17 feet 3¾ inches in length support the balconies over the entrance halls. In the second story, the girders are all of light sections, having merely to support the roofs. 136 of these are 26 feet 3¾ inches long; 16, 24 feet ¼ inch, and 8, 20 feet ¼ inch, the latter connecting the columns of the dome. 8 girders, 9 feet in length, run from the latter to other girders, serving as supports to some merely ornamental columns on the outside of the dome.

B. OUTSIDE GIRDERS.

The outside girders of the first story are formed of several pieces, one of which is seen in Pl. III., Fig. 4, with its sections marked by letters correspond-

ing with those in the elevation. Where these pieces join an 8-inch column, they are fastened to it in the same manner as the trellis girders. When joining the connecting piece of a 4-inch column, they are screwed to it by six $\frac{1}{2}$ inch tap-bolts. Three of these girders situated over the entrance-halls consist of 5 pieces each, viz. 2 pieces 3 feet $3\frac{7}{8}$ inches long, cast together with a connecting piece, and 3 pieces 11 feet 1 inch long, making a total length of girder, including 2 5-inch connecting pieces, of 40 feet $8\frac{3}{4}$ inches, the distance between the centres of the 8-inch columns being 41 feet 5 inches. Each lean-to is inclosed by 4 girders of a total length of 37 feet 5 $\frac{15}{16}$ inches, making 16 in all; each consisting of 4 parts, with three 5-inch connecting pieces between them. The two parts, joining an 8-inch column, being 9 feet $\frac{35}{64}$ inch long, the two centre ones 9 feet $\frac{59}{64}$ inch, the fronts of the aisles and sides of the entrance halls are inclosed by 16 girders, composed of 3 parts, the centre one of which is 8 feet $5\frac{3}{8}$ inches, the two others being each 8 feet $6\frac{1}{24}$ inches long, making the total length, including two 5-inch connecting pieces, 26 feet $3\frac{3}{4}$ inches; 6 consisting of two parts each 8 feet $5\frac{7}{8}$ inches long, making a total of 17 feet $5\frac{3}{4}$ inches, including one 4-inch connecting piece; and 6 girders of one piece 8 feet $5\frac{3}{4}$ inches long. The second and third story outside girders are shown in Pl. III., Fig. 5, consisting of respective 3 and 5 different parts; the sections are the same as in the ring-girders in the first story. Four of them under the fanlights are composed of five parts in the same manner as the three ring-girders over the entrance halls in the first story. 48 girders in the second story, and 32 in the third story are 26 feet $3\frac{3}{4}$ inches long, and composed of three parts, like those of the same length in the first story; while eight others in the third story, nearest to the dome, consist of three parts, one 8 feet $6\frac{1}{4}$ inches, the second 8 feet $5\frac{3}{8}$ inches, and the third 2 feet $2\frac{13}{24}$ inches long, making their total length, including two 5-inch connecting pieces, 24 feet $\frac{1}{4}$ inch. 16 outside girders of similar form, but of the necessary curve, encircle the dome at the height of the three story girders, the radius of the curvature being 54 feet $1\frac{1}{2}$ inches, the chord for each girder 9 feet $11\frac{3}{4}$ inches. Cast-iron louvres are attached to the inside of the ring-girders except to those over the entrance halls, which are of wood. One of the cast-iron louvres is shown in Pl. V., Fig. 13. Fig. 12 gives a view of one as originally contemplated by us, of the same construction as those employed in the London Crystal Palace, which would have excluded the rain much more effectually than those actually adopted. To the inside of the second and third story outside girders, wooden blinds, similar to those shown in Fig. 13, are fastened.

C. WROUGHT-IRON GIRDERS.

The part of the galleries over the naves is supported by 12 wrought-iron girders, 8 of which are like that shown on Pl. III., Fig. 6, while 4 others supported by three 4-inch columns, have extra standards corresponding to those columns. They are 40 feet 8¾ inches long, and like the cast-iron girders, 3 feet high. Each girder consists of a horizontal upper and lower flange connected at their ends by cast-iron standards of the same shape as the vertical ends of the cast-iron girders, and four middle standards at equal distances from each other, and the centres of their respective columns. All these standards and upper and lower flanges are connected with each other by diagonal ties of wrought-iron, secured by means of rivets, the size of which is proportioned to the strain they have to endure. The fastening to the columns is the same as in the other girders.

The top flange consists of 2 lengths of angle iron, placed one inch apart; the lower flange is made of 2 lengths of flat iron placed one inch apart, the iron being $4 \times \frac{1}{4}$ inch at each end, and $8 \times \frac{3}{8}$ inch in the middle. As these girders are 40 feet 8¾ inch long, and as the bars run about 16 feet in length, we adopted the system of splicing as being more secure than welding. The upper flange was spliced in the following manner:—In the space of one inch between the angle irons is filled two pieces of ½-inch flat iron, 4 inches wide and 1 foot 4 inches long are placed, the whole of which is riveted together with 4 ⅞-inch rivets. On the top iron plates ⅜ of an inch in thickness, the width being the same as that of the flange, and 1 foot 4 inches long, are riveted with 8 ¾-inch rivets. The lower flange is spliced in a similar manner, by riveting 2 plates of flat iron, each ½ inch thick between, and 1 plate of ¼-inch flat iron to each side of the lower rail, with 4 ⅞-inch rivets, the splicing plates being 1 foot 4 inches long.

Some of these girders, after being put into their places, showed some defects in their lower flange and the diagonals, after the floors were tested with a weight of 85lbs. to the square foot. In consequence of this, tie-rods extending from the top of the second story columns were employed to relieve the standards nearest to the columns, which produce a very bad effect to the eye, although the same security might have been attained by ordinary inverted trusses under the floor, such as were placed according to our advice under four of these girders by Mr. Kroehl, the assistant engineer.

IV. ARCHES AND FANLIGHTS.

Cast-iron arches (Pl. II., Fig. 4, and sections) supporting the roofs over the naves, are placed between and fastened to the 3rd story columns by ½-inch tap-bolts. They rest with their base on the brackets of the second story connecting pieces, which have already been described. The arches are 40 feet 7 inches wide, from their base-line to their top 22 feet 6 inches high, and east in seven pieces, one of which forms the keystone. The ends of the pieces are bolted together by ¾-inch bolts, and keys driven into key-seats, cut in their flanges, which, at the joints, have been faced so as to fit well. There are 20 of these arches in the building, 8 of which have key-stones differing from the remainder, as will be shown in the description of the dome.

At the end of each nave is a fanlight of the same exterior dimensions as the arches. Pl. IV., Fig. 18, with its sections, shows a part of this fanlight. It has a semicircular centre-piece, wherein are fastened small half-round columns, which support another semicircular piece of section *c c* cast in two parts, into which, and corresponding with the above mentioned small half round columns, are placed others of larger dimensions, but of similar description (section *d d*), which sustain the large outside ring, whose section is shown at *b b*. Over this is raised the top of the light which corresponds with the inclination of the roof. On account of the lightness of metal, and large surface of the fanlight, it was found necessary that it should be cast in several small pieces. For instance, the centre piece, the half round columns, the 2 pieces of the intermediate semicircle were cast separately, and the external arch in 12 distinct pieces, one of the joints of which is shown at *a a*. Behind this frame, and fastened to it, are wooden sashes. The fanlight is braced against the action of the wind by a system of horizontal wrought-iron trusses, similar to the vertical supports of the gallery floors. It rests upon a sill 1 foot 1 inch high, placed on the top of the outside girder, and stiffened by a system of trusses like those of the fanlights.

V. STAIRCASES.

On the outside are three flights of steps, leading from the streets to the main entrances (Pl. II., Figs. 1 & 3). They are 34 feet 6 inches wide, and supported by 7 cast-iron string-pieces, the bases of which rest on piers built of brick, capped with blue stone, and the upper ends resting on the top of the foundation walls of the building. Seven steps on the south, 15 on the west, and nine on the north side, of 6½ inches rise, and 13 inches width,

lead from the sidewalk to the entrance halls; the steps are made of yellow pine 1½-inch plank bolted to the string-pieces; the risers are of cast-iron.

Four staircases from under the dome,* and eight in the naves, lead from the first floor to the galleries, Pl. I. & II., Fig. 1. The steps have 7⅕ inches rise, and 11½ inches treaders. Those leading from the naves have a platform 27 feet long, 9½ feet wide, 12 feet 7⅕ inches above the lower floor, and supported by two 8-inch, and six 4-inch columns of octagonal shape, having a base 4 feet 6 inches high, the shaft being cast together with the connecting piece, to which are bolted 8 cast-iron trellis girders 2 feet high, and of a light section. 2 flights of 21 steps, 7 feet 9 inches wide, lead from the lower floor to this platform, and one flight of 19 steps, 8 feet 7 inches wide, from there to the gallery. The steps, which are of yellow pine 1¼-inch plank, are supported by two wrought-iron string-pieces, 2 feet high, made of 2 rails of $2 \times \frac{3}{8}$ inch flat iron, ¾ inch apart (Pl. IV., Fig. 14). The lateral connexion is formed by a kind of trusses of $1\frac{1}{2} \times \frac{1}{4}$ inch flat iron, as seen in Pl. IV., Fig. 15, showing the front view of this arrangement. The string-pieces are fastened at the top to the girders, and at the bottom to a cast-iron shoe (Pl. IV., Fig. 16, A B & C), resting on the floor beams. The string-pieces of the upper flight are fastened at the top by cast-iron standards (Pl. IV., Fig. 17), to the girders supporting the gallery floors, and at the bottom to the connecting pieces of the 4-inch columns (Pl. IV., Fig. 14). The stairs under the dome have two lower flights of 16 steps, each leading to the first platform, arranged in a semicircle, of which one dome column forms the centre (Pl. II., Fig. 1), the steps are in the middle, 11½ inches broad. The inside string-piece is curved to a radius of 8 feet 6 inches, and the outside to a radius of 16 feet 10 inches in the ground plan, making the width of the stair 8 feet 4 inches. The string-pieces are fastened at the top to the connecting pieces of the 4-inch columns supporting the platform, and at the bottom to cast-iron shoes (Pl. IV., Fig 16). The platform is supported by 6 4-inch octagonal columns, 7 feet $10\frac{7}{10}$ inches long, and a 5-inch connecting piece 2 feet 1 inch high. They are connected by 6 girders, one of which is curved to the radius of 8 feet 6 inches. From this platform, two other flights at right angles with each other (Pl. II., Fig. 2), and 6 feet wide, lead to the next platform, 16 feet 9⅗ inches above the ground floor, which is supported by four 4-inch columns, the shafts of them being 10 feet $7\frac{1}{10}$ inches, the base pieces 4 feet 6 inches, and connecting pieces 2

* We cannot omit to remark, that the Superintending Engineer strongly insisted upon having the four staircases under the dome taken away at the last hour, when they were raised and nearly finished.

feet 1¼ inches long, making their total length 17 feet $2\frac{7}{16}$ inch. These columns are united by four girders, two of which are arched. From each of these platforms, another flight of 12 steps leads to the galleries (Pl. IV., Fig. 14).

VI. GALLERIES.

A ground-plan of the galleries is shown in Pl. II., Fig. 2. The galleries are supported mainly by the girders, their weight being brought directly on the standards of the latter. Pl. III., Figs. 10, 11, 12, 13, and 14, show the arrangement of the gallery floors. Wooden binders B 27 feet long, of 10 × 3 inch white pine timber, run from the standards of one of the girders to those of the opposite one; they are supported at two intermediate points by inverted trusses, A, of 1¼ inch round iron crossing them at right angles, and supported by chairs H and I over the standards of the girders G. Across the binders B, and notched into them, are the joists F, of 7×2½ inch white pine timber, on which is nailed the floor of 1¼ inch yellow pine tongued and grooved planks. Pl. III., Fig. 10, shows a ground-plan of one square of the gallery floor: Fig. 11 shows the section of the wooden binders B, supported by east-iron struts, and steadied by brackets C. The truss-rods which support the binders are fastened at one end to a shoe I, of which, Fig. 14, A is a top view, B a front view, and C a vertical section. One of the 4-inch columns H with chairs attached receives the other end of the rod, and is illustrated by Fig. 13, A B & C showing plan, front view, and section. One of the joists D, running parallel with the trusses at right angles with the binder B, and resting with its ends in the shoes, is shown in Fig. 11; the ends of the other joists F, are supported by the top flange of the girders. Fig. 12 shows the mode of connecting the east-iron strut with the joists D D and the binder B. Between the two joists D D an iron saddle is put, which serves to keep the struts in their position by means of a ½ inch bolt passing through the binder. E is the flooring plank, and C the front view of the wooden bracket. Those girders which are in the middle of the galleries have double chairs for receiving the trusses, while the others have either a single chair as in Fig. 14, or a chair attached to the column as in Fig. 13. The binders are hung to the girders by oaken blocks 7×3 inches, and bolted to the former by ¾ inch bolts.

The ground floor is constructed in the following way: The binders, 12×3 inches, are supported at their ends by wrought-iron stirrups resting on the foundation walls and piers, and at intermediate points about 9 feet apart, they are supported by piles on the eastern, and small brick piers on the

western side of the building. Across these binders, joists of 7×2 inches are placed, to which the floor of $1\frac{1}{4}$ inch yellow pine is nailed, the plank being placed about $\frac{3}{8}$ inch apart, to facilitate the sweeping, and increase the ventilation.

VII. ROOFS.

The ground-plan of the roofs over the lean-tos is shown in Pl. IV., Fig. 2. Their pitch is one inch to the foot. On the outside-girders are fastened cast-iron shoes which receive the rafters, the inverted trusses supporting the purlins, and the gutters. Pl. IV., Fig. 10, shows a shoe which is fastened to a girder; Fig. 11 one fastened to the top of a 4-inch column receiving the eyes of a truss-rod. On the 8-inch columns are placed gutter shoes shown in Fig. 12. These receive a top ornament like L, Pl. IV., Fig. 1. Fig. 8 shows one of the standards bolted on the top of the girders, and supporting the purlins. Similar ones are placed over the columns, their lugs corresponding to the top of the columns. Their length varies; the first row of standards next to the outside girders which form the base of the triangle, is the lowest, being $8\frac{1}{2}$ inches; those next to the top are the highest, being 4 feet $5\frac{3}{8}$ inches. The intermediate ones are each $6\frac{1}{3}$ inches higher than those next below them. Between the flanges at their top are placed the purlins, which are made of 2 pieces of $2 \times \frac{1}{4}$ inch angle iron placed $\frac{3}{4}$ inch apart, and trussed by $\frac{3}{4}$ inch truss-rods. Pl. IV., Figs. 6 & 7 show the different plans for trussing the roofs. Fig. 9 shows a side view, a front view, and a section at *a a* of the hanging struts belonging to the different systems of trussing. On the top of the purlins are fastened, by means of cast-iron shoes, the rafters, which are made of 2 lengths of $2 \times \frac{1}{4}$ inch iron, $1\frac{1}{2}$ inches apart, which space is filled with strips of plank on which to nail the boards. Pl. IV., Fig. 8 shows a purlin of angle iron resting between the flanges on the top of the standards, and above the purlins the cast iron shoe, which holds the rafter, a section of which is given. The other figure gives a section of the purlin, with side view of shoe and rafter. The purlins run parallel with the outside girder, and the rafters run perpendicular to them.

Plate IV., Fig. 3, shows the ground-plan of the roof over the aisles. The pitch of the roof is one inch to the foot. Where the two arms of the cross meet, they form a valley, part of which is shown in the plan; this is supported by valley-rafters of extra dimensions. From the second column in the nave to the corner of the aisles a hip is formed, supported in the same manner. These hip and valley-rafters are formed of two $3 \times \frac{3}{8}$ inches angle iron placed $\frac{3}{4}$ of an inch apart. They are trussed by 1-inch round rods,

as shown by Pl. IV., Fig. 5. The struts are similar to those already described. Pl. IV., Fig. 4, is the plan of a roof over one of the naves. The purlins of these roofs are supported on shoes by the arches which span the naves, and trussed with two struts in each system. In this figure, A A are the columns, B a wrought-iron girder between the two arches next to the dome, also forming the ridge-pole, C C are the purlins, D D the rafters, E the outside-girder, and F the top of the fanlight. The ridge-pole is formed of two lengths of $3 \times 3 \times \frac{3}{8}$ inches angle-iron placed one inch apart, with studs between them, and riveted together every three feet by $\frac{3}{4}$ inch rivets. Pl. IV., Fig. 13, shows a gutter-shoe of the nave, with the lower part of the rafter and roof; also the cornice moulding, which will be hereafter described.

VIII. PANELS.

The spaces between the columns under the windows of the first story are filled with cast-iron panels, which are shown in Pl. III., Fig. 15. They are cast with mouldings on their outer, and strengthening ribs on their inner side, and are bolted with 3 $\frac{1}{2}$-inch tap-bolts to the columns, the joints being caulked with lead. Each piece has nine openings for reducing the weight and for ventilation. Those at the top *a* are covered by the moulding of the surbase, the middle ones *b* are larger and are fitted with louvres at the inside, as shown in Pl. V., Fig. 13, in front view and section, see also Pl. IV., Fig. 1, N. The openings at the bottom *c* are covered by the base-mouldings. These panels are 4 feet $10\frac{1}{2}$ inches high: 30 of them are 8 feet $6\frac{3}{4}$ inches long; 12, placed between the 8-inch columns 18 feet apart, are 8 feet 6 inches long. The dotted lines in the figure show the length of the panels in the lean-tos, in the inclosing of which the principal columns are 38 feet $2\frac{3}{16}$ inches apart, with 4 panels and 3 4-inch columns between two of them. The length of each panel is 9 feet $1\frac{1}{2}$ inches, and there are 42 pieces of them. Of the panels next to the towers which are cast without the opening *c*, 6 are 5 feet $1\frac{1}{2}$ inches long, and 6 others 4 feet $10\frac{1}{2}$ inches. Pl. III., Fig. 16, shows the panels of the second story in front of the aisles, having a height of 4 feet 1 inch and a length of 8 feet $6\frac{3}{8}$ inches; of these there are 30: 6 more are of the same height, but only 4 feet $10\frac{3}{8}$ inches long; they are cast without openings. Fig. 17 shows the panels which were proposed for the sides of the aisles, instead of which others of sheet iron were employed. In the original plan also in the third story, at the sides of naves, panels were arranged similar to those shown in Pl. V., Fig. 23. Their lower part forms arches resting on

the girders and bolted to the columns. Their height is 5 feet 4½ inches, 64 being 8 feet 6⅔ inches long, and 8 2 feet 3½ inches long; 48 others of the same height, and 8 feet 6⅜ inches long, have a base of the same inclination as the pitch of the hip over the aisles. The outside is shown in Pl. V., Fig. 20. Instead of these, however, the space was inclosed with sheet-iron. Pl. V., Fig. 23, shows the panels in the dome, of which there are 16, corresponding in height to the arched panels at the side of the nave. They are curved in the plan. The panels of the entrance halls are shown in Pl. V., Fig. 18. These are 2 feet 11½ inches wide and bolted to the columns. They consist of a base panel of the same height as those in the first story, and another which fills the space between this base panel and the bottom flange of the upper girder. Of those there are six. In the second story under the fanlights the space between the 4-inch and 8-inch columns, 2 feet 11½ inches wide, is filled by similar panels (Pl. V., Fig. 19), of which there are six.

IX. WATER-TABLE AND BASE-MOULDINGS.

In Pl. IV., Fig. 1, B shows the water-table, C the base, E the surbase. These different parts are each cast in separate pieces, namely, straight pieces and those passing around the 8-inch and the 4-inch columns. The lengths correspond with those of the panels.

X. TOP-MOULDINGS.

Pl. IV., Fig. 1, and Pl. VI., Fig. 12 and 16, show the mouldings around the joints of the 8-inch columns and connecting pieces, and Pl. VI., Fig. 14, those around the joints of the 4-inch columns; Pl. IV., Fig. 1, the cornice of the building; Pl. VI., Fig. 15 and 17, give the pieces of the cornice mitred around the 8-inch columns, and Fig. 13 around the 4-inch columns and gutter shoes. Pl. IV., Fig. 13, shows the cornice-moulding on a large scale; the gutter shoe is bolted to the top flange of the girder. The dark line above the roof planks and in the gutter shoes represents the tin covering the roof, at the end forming a gutter to be carried up and riveted to the top-flange of the cornice-moulding. This arrangement was not carried out, and the consequence was an overflow of rain water, partly remedied afterwards by soldering a piece of tin over the gutter, according to the dotted line A.

The top ornaments shown in Pl. V., Fig. 21, with their sections at *a a* and *b b*, are bolted to the upper flange of the cornice-mouldings, and were

intended to keep the tin of the gutter down, and thus produce a more perfect joint. The place over each 4-inch column is marked by the more elevated parts and over the 8-inch columns by a separate piece shown in Pl. IV., Fig. 1, at L. Pl. V., Fig. 22, shows the ornament over the centre of each nave, which serves as a base for an eagle with spread wings cast of zinc and gilt.

XI. ARCHES OVER WINDOWS.

Pl. IV., Fig. 19 shows one of the ornamental arches in front of the first story windows, which are secured to the bottom flange of the outside girder and to the column; their length is like that of the panels in the first story, Fig. 20, those in the second story, and Fig. 21 those in the third story, secured like the former. In front of the dome-windows are 16 arches like those of the third story, but curved according to the circle of the dome. Pl. IV., Fig. 1, gives a section of the inclosure in the lean-to. A is the foundation wall covered with a blue stone coping, D the basepiece, F the shaft, and H the connecting piece of a column, K the pinnacle connected with a gutter-shoe, and L the top-ornament, B the water-table, C the base-moulding, E the moulding of the surbase, G is the lower and I the upper top-moulding, covering the connexion of the several pieces, M the openings in the panels covered by the mouldings, N a section of the lower louvres, O the window sash, P the arch before the windows, Q a section of the upper louvres, R the gutter resting in its shoe, S the crowning ornament extending round the whole building, T part of a rafter with section of roof planks, U a piece of tie-rod under the roof, and V the girder, showing the mode of keying it to the connecting pieces.

XII. TOWERS.

The corners of the octagon formed by the building are marked by octagonal towers (see the ground-plan, Pl. V., Fig. 1), the centre of each being formed by an 8-inch column, which is connected through the girders with the main structure, and serves as main support for the winding staircase, as mentioned under that head. In each corner of the tower stands a 4-inch column, to which the panels are bolted. In the first and second stories these columns are put together in the same manner, and made of the same lengths as those in the main building in both stories, only the connecting pieces are 4 inches in diameter. That part of the towers projecting over the building is inclosed with panels between the columns, connecting

them at the same time; the latter are provided with two flanges 2 inches wide, and ½ an inch thick, Pl. V., Fig. 7. The panels are ½ inch thick cast-iron plates, secured to the flanges of the columns by ½-inch bolts with countersunk heads and six-sided nuts; they are provided, for the purpose of light and ventilation, with openings in the first, second, and third stories, with wooden louvres attached to them. The base panels are formed with mouldings corresponding with those of the other panels; the rest, such as water-tables, base and surbase mouldings, are of exactly the same profile as those running around the whole building.

The inside part of the towers is entirely open without panels, the columns, which are of regular octagonal section, being employed in supporting the circular stairs which lead inside the towers to the galleries and balconies. These winding stairs have one string-piece of wrought-iron fastened to the 4-inch columns. The steps are made of 1½ inch white pine, and secured by small wrought-iron knees to this string-piece, while the other end is fastened in a similar manner to the 8-inch columns. Both a ground-plan and elevation of the wrought-iron work is given in Pl. V., Fig. 11. The diameter of both the first and second story of the towers is 8 feet, while that of the third is 6 feet, with a height of 14 feet 6¼ inches. The fourth story, which is merely ornamental, has a diameter of 2 feet, and is 9 feet 7 inches high. Fig. 5 shows in an elevation the combination of the different parts of the towers for one side of the octagon. Fig. 6 gives a section of the same, showing also the 8-inch column in the centre, with a part of the girders. Fig. 1 shows the plan and the section at *a a* of the first story: 37 steps lead to the gallery; 6 towers have each 5 columns with flanges, and 3 of an octagonal shape, with 6 panels. In each of the other two towers, standing partly in the main building—partly in the machine arcade and without staircases, one column only is provided with flanges, and seven are regular octagons. The second story is shown in Fig. 2, both ground-plan and section at *a a*. In this story of the tower two of the columns are octagonal, and the rest cast with two flanges; there are in each tower 7 panels. The connecting pieces are 3 feet 9 inches high, and provided with brackets, to which the columns of the next story are fastened, see Fig. 8. The second story is crowned with a balcony and railing, the standards of which (Fig. 9) are fastened to the connecting pieces by means of sockets entering into the bore of them. The railing is given in Fig. 5, front view, and Fig. 6, section. The stairs in this story consist of 32 steps, with a small platform on the middle. Fig. 3 gives both a ground-plan and section at *a a* of the third story, which is entirely inclosed, one of the panels being on hinges

so as to serve as a door leading to the balcony and roofs of the aisles. Its columns are 3 inches in diameter, with two flanges. The top of the third story forms a second balcony, to which a stair of 19 steps leads. The third stories of the two towers, at the interseetion of the main and additional building, are used as reservoirs to supply the galleries with water, the level in the adjacent reservoir not being always of sufficient height to produce the necessary pressure for this purpose. The 8-inch column in the centre of the tower runs to the top of the third story; to it are attached, by means of 4 $\frac{1}{2}$-inch tap-bolts, brackets (Fig. 10) supporting the fourth story columns. The railing around the upper balcony is projecting over the sides of the third story; it is cast solid, and consists of an outer ornamental, and an inner plain plate of $\frac{1}{4}$-inch cast-iron.

The columns in the fourth story form a regular octagon of 2 inches diameter. As already said, they stand on brackets, fastened to the 8-inch centre column, united at the top by a cornice. A tube of boiler iron is inserted between them, instead of panels. The top is formed by a cap, consisting of 8 bars of flat iron, and covered with wood and lead. Through this cap and secured by it, passes the flagstaff, 24 feet high, resting with its foot in a shoe, on the top of the central 8-inch column. The flooring of the balconies is made of wood, covered with lead.

XIII. THE DOME.

Pl. I. and II., Fig. 1, 2, and 3 show the general form of the dome, which rises over the centre of the building; Pl. I. and II., Fig. 3, give sections of the building, through the centre. The fourth story columns, which have not been previously described, are octagonal, 8 inches in diameter, 9 feet 9 $\frac{5}{16}$ inches in length. Each pair is connected by a small cast-iron girder, instead of cross braces. Their distance from centre to centre is 4 feet 1$\frac{3}{8}$ inches. They have lugs only at the bottom, corresponding with those of the third story columns, to which they are bolted. The thickness of metal is $\frac{7}{8}$ inch. At each side they are provided with flanges 4 inches wide, and 1 inch thick, Pl. V., Fig. 5 and 6, which form the end standards of wrought-iron trusses, so placed towards each other, that if extended, they would meet in the centre of the column, and form the angles of a regular polygon of 16 sides. By referring to the ground-plan it will be seen, that each pair of columns stands in one radius of a circle, and they may, therefore, be classified as outer and inner columns.

All the wrought-iron trusses form two concentric, regular polygons, of 16 sides, 4 feet 1$\frac{3}{8}$ inches apart, while the lower stories form an octagon.

The distance between the inner columns, is 19 feet $5\frac{15}{16}$ inches from centre to centre; that of the outer columns, 21 feet $1\frac{3}{4}$ inches. Between the inner columns supporting the dome, are 8 wrought-iron trusses, 19 feet, $5\frac{15}{16}$ inches long; and between the outside columns, 8 others 21 feet, $1\frac{3}{4}$ inches long, Pl. II., Fig. 5. From each inner column, near the corner of the nave to the top of the first arch, are 8 wrought-iron trusses, 19 feet $5\frac{15}{16}$ inches long; and 8 others 21 feet, $1\frac{3}{4}$ inches, parallel with these, complete the regular polygon of 16 sides; Pl. II., Fig. 6. From the nave arch next to the dome, or rather supporting that part of it which rests on the naves, to the next arch in the nave, extends a wrought-iron truss, 2 feet $7\frac{1}{2}$ inches high, Pl. II., Fig. 7, consisting of an upper and lower rail, the upper one being made of $2\times2\times\frac{1}{4}$ inch angle iron, riveted to $4\times\frac{1}{4}$ inch flat iron, placed 1 inch apart. The lower rail is made of $4\times\frac{3}{4}$ inch flat iron. The bars are spliced like those in the galleries, and like them, have 2 standards, with diagonal ties of $4\times\frac{1}{4}$ inch flat iron. The two end standards are cast together with the keystone of their respective arches, and of a heavier section than the remainder of the arches. The keystone B, of the arch next to the dome, is shown at Fig. 7, with its section at *a a*, and in Fig. 6 is given a front view. At a distance of 4 feet $1\frac{3}{8}$ inches from the latter, is placed the outer standard D, Fig. 7, a section of which is shown at *b b*. Both these standards are 5 feet $6\frac{3}{8}$ inches in height, their top being on a level with the top of the fourth story columns. The two standards next to the dome in this wrought-iron truss, are united at the top by 2 lengths of $3\times3\times\frac{3}{8}$ inch angle iron, placed 1 inch apart, with a piece of flat iron riveted at the top of it, and by a cross of $4\times\frac{3}{8}$ inch flat iron. There are four of these girders, one in each nave; they serve also as ridge-poles, and have shoes fastened to their top flanges supporting the rafters. The arched bottom rail of these trusses, between the columns, starts at each end from the foot of the column, and at its top is riveted together with the straight bottom-rail of the horizontal part, the spandrils being filled with flat iron rings (Pl. II., Fig. 5). The arched bottom rail of the trusses, running from the corner column of the dome to the keystone of an arch, is connected in a similar manner with the horizontal part and the keystone (Pl. II., Fig. 6).

The horizontal part of each of these trusses consists of a top and a bottom rail, with diagonal braces and cast-iron standards, so arranged, that the opposite ones in the inner and outer truss, which are equally united by diagonal braces (Fig. 9), fall into the same radius of the circle. The ends of the top and bottom-rails are riveted to the flanges of the columns. On the top of these wrought-iron trusses, the cast-iron plate (Pl. II., Figs. 8

and 9), supporting the rib of the dome, is placed, which consists of 32 pieces bolted together by five $1\frac{1}{8}$ inch bolts, on flanges 1 inch thiek, and $2\frac{1}{2}$ inches high. In the middle, each piece of the bed-plate has a broad, solid piece, with projections, which, after being fitted, reeeives the shoes of the ribs, between which, and other projections, keys are driven to secure the ribs in their place. The thickness of the plate is 1 inch. Fig. 8 gives a top view of two of these pieces; A is the plaee of a rib, over the centre of the arch, and over each pair of columns; B is placed over each diagonal brace, between the two middle standards of the wrought-iron trusses, forming the fourth story of the dome; the dotted lines, Fig. 8, show the top rails of the trusses under the plate; Fig. 9 shows the diagonal braees mentioned above, and also a section of the bed-plate at *a a*, Fig. 8. Upon this bed-plate the ribs were fastened by eight 1-inch tap-bolts, and held in their place by the keys above described. The ribs, of whieh there are 32, consist of an upper and lower flange, as seen in Fig. 11, and are connected by trellis. Each flange consists of two lengths of angle iron, 1 inch apart, splieed in the same way as the girders; the outside flange is 72 feet 5 inches, the inside flange 69 feet 11 inches long. The distance of both flanges at the bottom is 18 ineheS, and 12 inches at the top. The dome forms a half-sphere of 100 feet in diameter, the centre of which lies one foot above the level of the bed-plate. The outside flange of each rib is made at the bottom of $3\times3\times\frac{3}{8}$ inch angle iron, the next parts of $2\frac{3}{4}\times\frac{3}{8}$ inches, $2\frac{1}{2}\times\frac{3}{8}$ ineheS, $2\frac{1}{4}\times\frac{1}{4}$ inches, ending at the top with angle iron of $2\times2\times\frac{3}{16}$ inches.

The trellis is made of $2\times\frac{3}{4}$ ineh flat iron, crossing and riveted to each other, and to the flanges. The ribs are fastened at their bottom to cast-iron shoes (Pl. II., Figs. 11 and 14). These shoes are 1 foot 10 ineheS long, 10 inches wide and 1 inch thick; in their middle they have a strengthening rib, 1 inch thiek, and 4 ineheS high, with smaller flanges against which the angle iron rests, to take the strain from the bolts, with which the angle iron of the ribs is fastened to the cast-iron. Fig. 13 shows the top end of one of the ribs, fastened to a cast-iron shoe, the details of which are shown in Fig. 15. These shoes are connected to each other by wrought iron braces, 1 foot 2 inches long, formed of 2 flanges of $1\frac{1}{2}\times1\frac{1}{2}\times\frac{3}{16}$ inch angle iron, and united by diagonals. These 32 shoes, conneeted by the braces, form the upper ring of 20 feet diameter on which the lantern rests, as is seen in the section Pl. I., and in Pl. II., Fig. 3. It has a height of 17 feet 1 inch, besides the top ornament around the flag-staff, 2 feet 4 inches high. Under the ring piece an inverted cone of flat iron rods is formed, to give the flag-staff a better support, the latter being fastened to

the bottom of this cone, 10 feet below the upper ring, and to the top of the lantern, from which to the bottom of the cone measures a distance of 28 feet; the whole length of the flag-staff being 72 feet. The lantern is made of ribs of $2 \times \frac{3}{8}$ inch flat iron.

The ribs are braced by diagonal tie-rods extending from the inside flange of one to the outside flange of the next rib, around the whole dome. These braces are of $\frac{3}{4}$-inch round iron, and for the purpose of adjustment, meet in a ring of wrought-iron, their ends passing through it, and being kept in place by screws and nuts; Fig. 10 shows the relative position of these ribs. The horizontal braces, shown in this figure, were not employed, except in the row next to the lantern. The distance from end to end of the brace to the other, on each rib, is 12 feet. At the base of the dome, between the ribs, are 32 windows, the cast-iron frame of one of which is shown in Fig. 18, with section at *a a*, and *b b*. At a height of 24 feet from the bed-plate, measured on the curve, are 32 other windows, the frames of which are of two different forms, arranged alternately around the dome (Fig. 16 and 17). These frames of light cast-iron, curved to a section of a zone, rest on a plane of frame-work of angle iron, fastened to the ribs of the dome. Wrought-iron studs are placed between both frames. All these window frames are filled with wooden sashes. At the foot of the lantern are 32 more lights, 2 feet 4 inches high, arranged. The dome is covered with tin on boards, nailed to curved pieces of oak, 2×2 inches, placed horizontally around the ribs, 2 feet apart. The lantern is likewise covered with boards and tin.

The raising of the dome was accomplished in the following manner: The lantern was completed on the ground, and raised between two poles, about 10 feet higher than the required height of the dome. Four derricks were then placed on the bed-plate of the dome, by which the ribs, brought to the spot, on account of their length, in three different pieces each, were, after having been riveted together on the ground, hoisted to their places, bolted and keyed to the bed-plate, and bolted to their shoes in the upper ring, supporting the lantern. When this was done, and the braces adjusted, the lantern was disconnected from the poles, which were then removed. The contractors for raising the building deserve great credit for their skill in raising the dome, which was accomplished in $4\frac{1}{2}$ working days; much is also due to the contractors for the iron work, the assistant engineer superintending the whole construction and erection of it, and last but not least, to the efficient body of mechanics who, in sunshine and storm, applied themselves steadily to their labors.

The panels inclosing the upper story of the dome and its cornice, are shown in Pl. V., Fig. 14; but instead of the lower panel work, with its mouldings, sheet-iron was substituted.

The outer surface of the dome was intended to be ornamented with wooden ribs, as shown in the perspective view, which were ready, and even brought on the ground, but, contrary to our wishes, were never put in their places.

XIV. WINDOWS, SASHES, AND DOORS.

The window sashes are made of pine wood, with cross-bars, and glazed with American window-glass of 38×16 inches, and 32×16 inches.

The doors at the entrances slide upwards, their width being equal to the distance between the 4-inch columns. They are glazed in the upper part, with panels at the base, of the same height as those in the first story inclosure. Over the door is a stationary sash, the distance between the floor and the bottom flange of the girder being equally divided, thus making the entrace $10\frac{1}{2}$ feet high. Each entrance has three doors; three sliding sashes provide access to the balconies from the gallery in a similar manner.

XV. RAILING.

Pl. V., Fig. 17, gives an elevation of the railing around the galleries. It is three feet in height, and fastened to the columns. Two cast-iron standards placed over the vertical struts of the trellis girders, and bolted to the floor, give additional firmness. The railing is made of wire-work, with a black walnut top rail, 2×3 inches. The railings of the stairs follow the same design.

Pl. V., Fig. 15, gives the design of a cast-iron railing; and Fig. 16, a wrought-iron one proposed for the balconies, but not used, that of the galleries being substituted.

Pl. VI., Fig. 8, shows the railing designed to inclose the grounds. The main posts, between which are two smaller ones, are 27 feet apart, and support lanterns. In front of the main entrance, are sliding gates of the same design.

XVI. MOULDINGS OF THE COLUMNS.

The base mouldings of the 8-inch columns are shown in Pl. VI., Fig. 10, and those around the 4-inch, in Fig. 9. They are cast in 2 pieces, connect-

ed by small bolts, secured in angles of wrought-iron. The inside top mouldings are cast of zinc. Those of the first story are given at Fig. 16, of the second at Fig. 11, showing likewise the ornamented brackets, supporting the arches of the nave. The mouldings in front of the gallery floor are of wood, and correspond with those around the top joints of the first story columns.

XVII. ADDITIONAL BUILDING.

The columns in the two story building are of the same height as in the main building. Those of the sheds are cast in one piece each, being on the outside 15 feet $4'\frac{1}{6}$ inches high. The row between the outside columns and those forming the two story building, are 13 feet $1\frac{1}{1}\frac{1}{6}$ inches, as the roof of this part slopes towards the inside, 1 inch to the foot. A part of the sheds was made higher than the remainder, to accommodate the steam engine already engaged.

Of the first story columns there are 33 of 8 inches in diameter, and 63 of 4 inches in diameter, of the same height as those in the main building; the connecting pieces of 2 of the latter were cast with pieces of the ring girders. The total length of this girder is 40 feet $8\frac{7}{8}$ inches, like those over the entrance halls. The girders supporting the gallery are shown in Pl. VI., Fig. 6, which gives a transverse section of the two story building. They have a length of 20 feet $3\frac{3}{4}$ inches, and are fastened to the columns in the above described manner, with the exception of 4, which are bolted with one end to the connecting pieces of columns in the main building (already carried up too high as that the connecting pieces could be changed), and two others only 16 feet $7\frac{7}{8}$ inches long, which are bolted with one end to a small brace, between the connecting pieces of two 4-inch columns, forming one side of the towers, at the east end of the building.

Of the ring girders one is 40 feet $7\frac{3}{4}$ inches long, like those over the entrance halls; two consist of 3 pieces, each having a length of 26 feet $3\frac{3}{4}$ inches, composed like those in the main building; two others, having a total length of 22 feet $7\frac{1}{8}$ inches, consist of three pieces, respectively 8 feet $6_{2}\frac{1}{4}$ inches, 8 feet $5\frac{3}{8}$ inches, and 4 feet $10\frac{1}{6}$ inches in length, with two 5-inch connecting pieces between them. Another pair are 20 feet $3\frac{3}{4}$ inches long, of 3 pieces each; the middle piece being 8 feet $5\frac{2}{3}$ inches long, and the others 5 feet $6_{2}\frac{1}{4}$ inches long, with two 5-inch connecting pieces; 5 girders 15 feet $3\frac{3}{4}$ inches long, are of two pieces, each being 7 feet $5\frac{3}{8}$ inches long. There is one trellis girder, 26 feet $5\frac{3}{4}$ inches long, with

a standard altered so as to allow the belt of the steam engine to pass through. In the second story of this building, we have 30 8-inch columns, with connecting pieces; 60 4-inch columns, the connecting pieces of two of which are cast with pieces of the outside girder, like those under the fanlights; 56 of these are provided with chairs for the truss rods supporting the gallery floor. The girders across the second story are seen in Pl. VI., Fig. 3. They are bolted to the connecting pieces, and have tie-rods to prevent their spreading. 14 of them are 20 feet 4 inches in length; two next to the towers are 16 feet 8 inches, and are fastened at one end in the same manner as the corresponding ones under the gallery floor; two 20 feet 7 inches long in the centre, are fastened at one end to the connecting pieces of the 4-inch columns. The outside girders correspond with those in the second story of the main building, and are of the same length as those below in the first story. These girders are longitudinally connected by two rows of girders resting on the top flanges of the former, 8 feet 10 inches apart, from centre to centre, and 4 feet 6 inches high, each being one inch shorter than the distance between the centre of the corresponding columns. The whole length of this row of girders is 419 feet 5 inches; they are kept steady by cast-iron arches, each firmly bolted together with the vertical end flanges of two pairs of girders, and at the same time supporting the elevated roof of the central part (Pl. VI., Fig. 3); the two ends of the whole structure are formed by two fanlights. (Pl. VI., Fig. 7.) The ridge-pole of this roof is formed of 2 lengths of angle iron, $3\times3\times\frac{3}{8}$ inches, placed 1 inch apart, and supported at every 9 feet by a rafter of 2 plates of $2\times\frac{1}{4}$ inch flat iron, with a strip of plank 1 inch thick between them, and the rafters resting at both ends on shoes screwed to the top of the longitudinal girders, a tie-rod acting against the lateral strain. The rest of the rafters are similar to these, but rest on the ridge-pole. The roof over the remainder of the second story rests on rafters, and 4 hip rafters, the latter supported by purlins of $2\frac{1}{2}\times2\frac{1}{2}\times\frac{3}{16}$ inch angle iron, and trussed by simple truss rods. It was first intended to have the central roof covered with glass, but afterwards it was determined to cover it with wood. The gallery is lighted wholly by the fanlights and windows. Wooden ventilators are placed behind the longitudinal girders near the floor, the sides of the second story being boarded up, to provide wall space for hanging the pictures, and wooden louvres are also employed behind the second story girders.

In the sheds are 9 8-inch and 20 4-inch columns, 15 feet $4\frac{1}{16}$ inches high, and in the middle row are 6 8-inch and 15 4-inch columns, 13 feet

$1\frac{11}{16}$ inches high. The girders inclosing the outside are 2 feet high, like the trellis girders supporting the stairs in the main building. They are bolted to the columns by six $\frac{3}{4}$-inch tap-bolts. The middle row of columns is connected with the girders in the same manner. Of these, there is a total of 18 girders composed of 3 pieces, with a total length of 26 feet 4 inches, and 4 composed of 2 pieces, having a total length of 15 feet 4 inches.

The system of trussing the roof is similar to that in the main building. The principals are made of double angle iron, $2\times2\times\frac{1}{4}$ inches, $\frac{3}{4}$ inch apart, and strengthened by inverted trusses of $\frac{3}{4}$-inch round iron, with cast-iron struts, the one under the middle of the principal being 2 feet $8\frac{3}{16}$ inches high. The valley purlins are made of double $3\times3\times\frac{3}{8}$ inch angle iron. On the top of the rafters, running parallel to the girders, are placed rafters made of $2\times\frac{1}{4}$ inch flat iron, with a strip of wood 2×1 inch, to which the boards are nailed. There are five sky-lights in these roofs. The panels, with water tables and base-mouldings, are precisely similar to those in the main building. At each end of the arcade towards the streets two folding-doors, 8 feet $6\frac{2}{3}$ inches wide, and in each shed 2 others of the same width, are placed. The arches in front of the windows are made of wood, similar in appearance to the main building, whereas those in the two story building are of cast-iron, like those in the main building, with only slight alterations according to the different spaces between the columns. The same can be said of the mouldings of the columns, floors, and other minor parts of the construction.

Before concluding our task, we may be allowed to add a few words about the testing of the girders. This was accomplished in the following manner: each cast-iron girder was placed with its ends on two supports of masonry, and a pressure produced upon the top flange, on two points above the vertical struts, by strong wrought-iron levers, the fulcrums of which were on one side of the girder, whereas the other ends were provided with scales, sustaining an ascertained weight of pig-iron, the effect of which would of course vary according to the length of the lever. The trellis girders, for the support of the galleries, weighing about 1800 lbs., were tested with a pressure of fifteen tons; those for the support of the roof weighing about 1600 lbs., with ten tons applied to the above described points.

Experience in the London, as well as in our building, has shown the admirable way in which this form of girder fulfils its double function, as supporting great weights, and bracing a light structure of slender columns.

APPENDIX.

I.

To the Honorable Board of Directors of the Association for the Exhibition of the Industry of All Nations, New York.

GENTLEMEN,

In presenting a new plan for the intended American Exhibition Building, I beg leave to introduce it to your notice by the following short remarks:

The entire plan is embodied in the seven drawings herewith transmitted in the accompanying six frames. They are merely sketched, owing to the very limited time that could be bestowed on their execution; scarcely three weeks having elapsed since I learned that the project was still open for competition, and, consequently, resolved to give form to the ideas I had, for some time, entertained on the subject. The indulgence of the Honorable Board of Directors is, therefore, respectfully solicited, with regard to the want of finish perceptible in the drawings. It is, however, believed, that they are sufficiently elaborate to give a clear idea of the leading points, and to admit of an unembarrassed judgment as to the adoption or rejection of the plan. They are executed under the joint supervision of myself and a practical architect, whose valuable assistance I have been fortunate enough to secure, and from whose knowledge and experience, I feel convinced, essential benefit would be derived, in case of the adoption of my project, and its consequent execution.

The leading features of the plan I have the honor to submit have originated in the nature of the ground allotted to the proposed edifice, and of its immediate vicinity. On examining Reservoir Square, I could not but be vividly impressed with the disadvantages of the locality, when compared with that of the Crystal Palace of London, which admitted of a free view of the edifice from all directions, besides being of unlimited extent, and affording natural auxiliaries in point of picturesqueness that are entirely wanting on Reservoir Square. Here we have to contend with the most prosy bareness of the surrounding district, with the overwhelming heaviness of the neighboring fortress-like and colossal Croton Reservoir, and with the restricted space for the building itself, as well as for the effect of an exterior view. Nature did wonders to give relief to Mr. PAXTON'S splendid creation, and as she does nothing for us, we must have recourse to art, in order to meet creditably the public propensity of drawing comparisons without the least regard to the existing circumstances. Comparisons they *will* make, and the fewer points of similarity there are between the two structures, the more favorable will be the impression of the New York Exhibition Building, since it will appear endowed with the charms of novelty and originality; and thus escape the stigmatizing ridicule of being a miniature imitation of something much superior. No effort, which a wise economy will admit of, should therefore be spared to give it this effect. This view has led me to propose the form of an octagon,

surmounted by a cross and a dome. The aspect of such a building will be entirely different from that of the London Crystal Palace. Its form affords all requisite scope for a pleasing variety of architectural embellishment, by which the monotony of Mr. PAXTON's design can be avoided, and allows a much more economical use of the given ground, which, being very limited, ought to be made as profitable as possible. The rising dome, independent of its effect in the interior arrangement of the edifice, will save it from appearing insignificant in the immediate vicinity of the Croton Reservoir; being higher, by ninety feet, than the latter, and contrasting favorably by the lightness of its style, as will the whole building, viewed near the massive walls of its heavy neighbor. It is believed that upon this plan a building can be erected, which will be at once creditable to the nation by whose enterprise it is called into existence, and most completely answer the purpose to which it is to be devoted.

The following are the objects which I have striven to combine in my plan:

1. The greatest possible interior area.
2. Perfect safety and elegance of construction.
3. A well calculated and pleasing admission of light.
4. Variety of *coups d'œil* in the interior, in order there to counterbalance the disadvantages which cannot be entirely overcome in the exterior.

Ad. 1. The proposed edifice is calculated to contain a principal floor, 111,200 square feet (Plan I.), a basement, 160,000 square feet (Plan II.), and a gallery 62,000 square feet (Plan III.), or an aggregate area of 333,800 square feet, being about a third of the floor and galleries of the London Crystal Palace, which measured 973,500 square feet.

Ad. 2, 3, *and* 4. The geometrical elevation and section, as given on Plans IV., V., and VI., represent perspective views of the Interior and Exterior.

Although explanations of the different parts of the building are given on the geometrical plans, and the perspective views afford a pretty comprehensive idea of the whole structure, I still take the liberty of adding a few observations: The construction will not meet with any difficulties, the horizontal strain being inconsiderable, and the vertical pressure easily resisted by the strength of tested columns, girders, and arches, which will be connected according to the system of Messrs. PAXTON, and FOX & HENDERSON. In the centre of the principal floor is an inclosed area, 80 feet in diameter and 13 feet deep, with a fountain in the middle, and four grottoes with springs under the platform; and staircases leading down to the basement, which thus will receive light both from the interior and the exterior of the building. This inclosure under the elevated dome, surrounded by statues, niches for flowers, and other decorations, as well as tastefully arranged resting-places, will undoubtedly produce a very picturesque effect. Its peculiar arrangement is suggested, in order to afford a view of the fountain in all parts of the building, for its play may be observed from the basement and galleries, as well as from any point of the principal floor.

The distance between the columns in the aisles, and "Triangles" (Lean-tos, Plan I.) is 27 feet. The height from floor to ceiling 23 feet. The four entrance halls are all laid out alike in the plan, but can easily be arranged in different styles, or to suit different purposes, if it should be required; thus a convenient covered carriage way, for the admittance of vehicles exclusively, might be laid on the eastern front, facing the Reservoir. Connected with the entrance ways, 24 administrative offices have been contemplated.

Four large and twelve winding staircases connect the principal floor with the gallery which

opens on the four balconies, each 2,000 square feet, situated over the four entrance halls, and affording ample space for flower decorations, statues, vases, etc. It also contains a Ladies' refreshment saloon and private room. It forms a cross whose intersection is surmounted by the dome. The latter is 100 feet in diameter at its base, and 136 feet high from the basement-floor to the base of the lantern which terminates it. The additional height of the lantern is 18 feet. Thus the central structure rises 147 feet above the grade of the adjoining streets. The dome receives light from the lantern, as well as from the sides, on which 32 transparent escutcheons in colored glass, representing the arms of the Union and its 31 States; or, if preferred, the emblems of the different nations, form a part of the decoration.

The basement is proposed to be connected with the principal floor likewise by 4 large and 12 winding staircases. Its area forms a square, being extended under the four terraces (Plan I., P). Its height from floor to ceiling is 17 feet. In two of its corners are commodious entrances for carts, drays, etc.; allowing heavy materials and goods to be entered in the building a considerable time before it is finished, and thence to be disposed of with facility; thus a great impediment to the speedy progress of the works and the final interior decorations will be avoided.

The basement will, besides, afford very convenient room for exhibiting objects of large dimensions and heavy construction, such as locomotives, engines, railroad cars, vehicles of every description, agricultural implements, naval structures, timber, and the like.

A part of the basement may also be divided by partitions into saloons for refreshments, or similar purposes, which, it is believed, would be a lucrative source of revenue to the enterprise.

An engine-room, for the production of the motive power for machinery, might also be arranged in the basement, although it will be far more desirable to keep boilers, large fireplaces, and fuel at a proper distance from the building.

All the floors are calculated to be laid with tongued and grooved boards, and to receive a number of small movable reservoirs or "*caissons*," 2 or 3 feet in diameter, covered by cast iron perforated rosettes, to answer the purposes of cleanliness. In the London Crystal Palace, the planks of the floors were laid half an inch apart, with a view to a more ready mode of cleaning the place by sweeping the dust, etc., between the boards. Very serious inconveniences arose from this method of laying the floors, among which, the almost certain loss of any small article or trinket that was dropped, was not the least. The proposed system of introducing a number of movable receptacles of the dust, is calculated to obviate the inconveniences experienced in London, whilst it will retain all the advantages of speedy and thorough sweeping.

The exterior of the proposed Crystal Palace is kept mostly in the Venetian style, the most favorable for lightness and elegance, combined with strength.

As it is probable that the surrounding lots in 6th Avenue, 40th and 42d streets, will be covered with houses very soon, it is proposed to surround the Exhibition Building by an inclosure 20 to 25 feet broad, with walks, trees, etc.; and thus to give it an apparent artificial distance from the neighborhood, which in reality cannot be secured. The four "Terraces," each about 10,000 square feet (Plan I., P) with fountains, shrubbery, seats, &c., it is also proposed to inclose by iron railings.

The different roofs are intended to be covered with lead and tin. The character of a "Crystal Palace" will be amply preserved by the free use of glass on all sides of the octa-

gon, cross, and dome; but it is believed that a glass-roof, like that used in London, would be pernicious to the interior of the building, as the brightness of our sky would be much too glaring for endurance, if received through the medium which was so appropriate in England. Moreover, a glass roof would be found the source of serious annoyances, chiefly in winter time for instance, in case of heavy snow.

A steam warming apparatus should be introduced; experience in superintending the erection and management of very extensive establishments having convinced me of the beneficial effect of keeping a temperature above freezing point, even when the building is entirely deserted by visitors.

These cursory remarks, in addition to the explanations on the plans submitted, will, I believe, suffice to elucidate my ideas.

I annex a schedule, containing the estimate of cost which the erection of the proposed edifice would involve. It amounts to about $300,000.

In this estimate the cost of introducing gas, water, and steam has not been included. These works ought, however, to be made simultaneously with the foundation and erection of the edifice, from urgent reasons of economy.

Wishing to have judgment passed upon the merits or demerits of my project, on the sole basis of the plan submitted, I beg leave, for the time being, to withhold my name, as well as that of my friend and assistant architect, and to subscribe myself, with great respect, the Honorable Board's

Most obedient servant,
THE PROJECTOR.

New York, August 4th, 1852.

II.

To the Honorable Board of Directors of the Association for the Exhibition of the Industry of All Nations, in New York.

GENTLEMEN,

Agreably to your directions, we have made some modifications in our plan for the Crystal Palace, with a view to reduce the expense of its erection, without changing its leading features. We herewith have the honor to submit the new estimate, according to which the building can be executed for a sum not exceeding $200,000; being one third less than the original calculation. In order to accomplish this reduction we have altered the first plan in the following particulars.

The basement which was originally proposed has been entirely rejected, by which an area of about 150,000 square feet has been sacrificed to the necessity of economy.

The proposed four terraces at the outside corners of the Palace, which were more ornamental than essential, have also been abandoned.

Likewise the railing around the edifice, and the flagging of the sidewalks.

Adequate modifications in the interior decorations have also served materially to reduce the expense.

The first calculations, having been made without any knowledge of the existing limits in point of expense, included every thing to the least detail in the greatest perfection, and were besides prepared with a view of covering any omission that might have occurred, owing to the hurry in which the items had to be specified — so as to prevent the fre

quent reproaches against architects, of furnishing first estimates, within the limits of which it was impossible to carry out their plans.

It will, therefore, be obvious to the Honorable Board, that the specified rejections and modifications suffice to reduce the expense of the execution fully one third below the first estimate. At the same time, the dimensions, the outward form, and the interior arrangement (save the basement), have been retained *in toto;* and the appearance and effect of the edifice will still remain the same as that of the first plan, which the Honorable Board has been pleased to honor with their approbation.

We have retained the galleries, after mature consideration of the question of rejecting them. In the first place, they add materially to the strength of the construction, and comparatively little to the expense. Secondly, they are essential as a transition from the wide area of the floor, to the high dome, whose diameter is necessarily so much less than that of the octagon, and which instead of gracing the edifice would disfigure it, if the galleries did not intervene between it and the lower floor—contracting the dimensions of the building at half its height, and giving it that unity of style which is both pleasant to the eye and beneficial to the effect of the light. And last, not least, the galleries contain an area of 62,000 square feet, which, after rejecting the basement, we do not think could well be spared. For, if we gave up this space, we would retain only that of the principal floor, not exceeding 121,150 square feet. This would not be greatly more than the aggregate area of the floor, galleries, and stage of Castle Garden, which is barely sufficient for the annual exhibitions of the American Institute; and, as we may presume that America will furnish at least as many objects of exhibition as are annually sent to Castle Garden, we cannot but think that the rest of the world will contribute objects in sufficient quantity to demand the residue of the floor, and the 62,000 square feet of the galleries. The latter are, moreover, indispensable, to afford visitors a "*coup d'œil*" of the whole exhibition, whose impression carried home and detailed to friends, or heralded by the entire press of the country, will tend to swell to millions the number of visitors, and, consequently, amply justify the trifling expense of the galleries.

We beg the Honorable Board to pardon us for recurring in several instances to the æsthetic point of view. In our opinion it has great weight, not only with regard to the pretensions of the public taste, but also as a mere question of matter of fact success; for it cannot be doubted for an instant, that a due regard for beauty and taste, in such an establishment, goes far towards making it profitable.

No wood will be employed in the construction of the whole edifice, except for the floor; the rest being exclusively of glass and iron, tin and sheet-lead, or corrugated-iron.

Reservoir Square having an inclination of about six feet towards 6th Avenue, a substructure of that height becomes necessary on the west side, in order to produce a level. This will not only add to the appearance of the edifice, but will also give a considerable room under the west end of the floor, which may be made profitable in various ways.

We have annexed to the new estimate a number of drawings of details, to facilitate the scrutiny of our calculations. The scale of dimensions is added to each, and the cubic measure and weight given, so that experts will have no difficulty in making the requisite calculations, or in tracing the whole plan of the construction, in which we have explicitly followed the well tested system of Messrs. Paxton, and Fox & Henderson.

Our estimates have been made with minute precision, and we, therefore, confidently submit them to an impartial judgment. If we should be fortunate enough to obtain the Honorable

Board's approbation in such a manner as to warrant us in hoping for the final adoption of our plan, we would then be able to prepare the necessary working-drawings in full size and execution, which want of time has not admitted of producing as yet. It has not been our intention to contract for the erection of the building, but only to offer our services as architects and superintendents; *i. e.* to furnish the plans, specifications, working-drawings, &c., and to see them faithfully carried out by the contractors. It appears to us upon investigation that no one foundry would be able to furnish the iron-work required, within the given limits of time. We therefore suggest that it be divided among several contractors, each to be furnished with accurate working-drawings and specifications. This would secure both promptness and cheapness, each taking that part of the work which he has most facility in doing.

Should the Honorable Board direct that we, in case of the adoption of our plan, also assume the position of builders, we would then require a fortnight after the decision in favor of our proposals, to procure satisfactory security as to their prompt and faithful execution in accordance with our estimates. It has been impossible to obtain, before this, the detailed opinions of the leading establishments on the various items of our estimate, owing to the very limited time allowed us for reducing our plan to the prescribed limits of expenditure; but we have so carefully weighed every detail, that we confidently leave it at the option of the Honorable Board either to contract with the respective establishments, on the basis of our estimates, or, by ordering us to assume the responsibility of their correctness, to make it our duty to bring in the requisite security.

We entertain so favorable an opinion about the whole enterprise of the Exhibition, carried out in the spirit which animates the Honorable Board, that we would be glad to receive the remuneration the Honorable Board may be pleased to agree upon for our services, half in cash, and half in stocks of the Association.

We have the honor to be, with high esteem, the Honorable Board's

Most obedient servants,

G. CARSTENSEN & C. GILDEMEISTER.

New York, August 11th, 1852.

III.

ASSOCIATION FOR THE EXHIBITION OF THE INDUSTRY OF ALL NATIONS.

OFFICE, No. 53 BROADWAY, NEW YORK, 12th August, 1852.

SIR,

You are requested to attend at this office, with the drawings and specifications of your plans, as far as completed, to meet the Board of Engineers appointed to examine the same, on Friday, 13th inst., at 2 P. M.

By Order,

WM. WHETTEN, *Secretary.*

Messrs. CARSTENSEN & GILDEMEISTER.

IV.

ASSOCIATION FOR THE EXHIBITION OF THE INDUSTRY OF ALL NATIONS.

NEW YORK, 16th August, 1852.

GENTLEMEN,

Before entering upon the examination of the plans offered for the Exhibition building, it

is desirable that we should clearly understand the terms upon which those plans may be made use of by the Board.

I must beg you, therefore, at your early convenience, to state on what terms you will place your plan at the disposal of the Board, in the event of its acceptance by them; you furnishing all the detailed working-drawings and specifications complete, so that other parties may make a bid upon them. Also, whether it is your intention to become the contractors for the execution of your design.

I am, very respectfully,

Your obedient servant,

C. E. DETMOLD, *Engineer, &c.*

Messrs. Carstensen & Gildemeister.

V.

New York, August 18th, 1852.

C. E. Detmold, Esq.,

Sir: — In reply to your esteemed favor of the 16th inst., we beg leave to make the following remarks.

When we submitted our plan in competition for the contemplated American Exhibition Building, it was less with a view to any immediate pecuniary benefit to be derived from this enterprise, than for the purpose of gaining, if possible, an opportunity of introducing ourselves favorably to the public as architects. We were of the opinion that, in case of the adoption of our plan, we should, ourselves, occupy the position of superintendents, during the erection of the building. The fact, which we subsequently learned, that the Board of Directors have appointed you superintending engineer and architect, and Messrs. Allen & Hurry consulting engineers and architects, does not, in our opinion, change the position of the projector; for it is but proper and just that he should guide his own work, in connexion with, and under the control of his employers or their attorneys. Thus only can the work be carried out in the spirit that animated the architect in preparing his plans.

The project we have submitted has been matured in an uncommonly short time. The drawings laid before the Board are necessarily only hasty sketches of what we intend to execute, with greater care, if the work be confided to us. It would, therefore, be next to impossible to realize our views, if the execution of the various details of the works were placed entirely in the hands of others.

If, therefore, the Honorable Board should be pleased to adopt our plan, we could not but wish ourselves to lead the execution, in connexion with yourself, as the superintending engineer and architect, and controlled by you, in order not only to furnish the requisite working-drawings, &c., but also to have a voice in the manifold details, modifications, alterations, &c., which generally are incumbent upon the architect in his capacity of superintendent, decorator, &c., during the progress of the execution of his plans.

As it will be our duty to devote all our time to the best and most speedy development of the enterprise, and to hold our services exclusively at the command of the Board of Directors until the entire completion of the edifice, we shall be obliged to set aside, for a longer period of time, all other occupations, and we will necessarily have to incur a number of extraordinary business and personal expenses during the execution of so vast a work in so limited a space of time. In consideration of these circumstances we trust that the Honorable Board will find our claim of a remuneration of $5,000 for our joint services a reasonable one.

In conclusion, we beg to say that, although we originally have not entertained the idea of entering into a contract with the Association, by which we would bind ourselves to execute the edifice for a given price, and before a given day, we would, nevertheless, now be willing to take such a contract, as we have reason to believe that we should be able, before the close of this week, to secure the timely execution of our project, for the sum of $195,000, by responsible establishments of this city.

Requesting you to lay these, our observations, before the Board of Directors, in your report of the subject, We have the honor to be Sir,

With high regard,

Your very obedient servants,

G. CARSTENSEN & C. GILDEMEISTER.

VI.

ASSOCIATION FOR THE EXHIBITION OF THE INDUSTRY OF ALL NATIONS,

NEW YORK, 25th August, 1852.

GENTLEMEN,

Will you have the goodness to meet at this office, this afternoon, at half-past four o'clock, a Committee appointed to confer with you on the subject of your Plan?

Your obedient servant,

W. WHETTEN, *Secretary.*

Messrs. CARSTENSEN & GILDEMEISTER.

VII.

NEW YORK, August 26th, 1852.

GENTLEMEN,

We have received your inquiry as to whether we would be willing to furnish our plan of the Exhibition building, in case of its adoption, for the consideration of $5,000; half in cash, and half after the enterprise should have cleared ten per cent.

In reply to this question, we beg to reiterate what we have previously expressed, viz. that we have entered into the competition far more with a view of gaining an opportunity of establishing our reputation as architects than as a matter of pecuniary speculation. We also expressed our firm confidence of the success of the enterprise, and our consequent willingness to receive half of our fee in stocks of the company. Becoming subsequently aware of the limited means at the disposal of the company, and being asked to state the terms on which we would furnish the plans, &c., for the building, we took into serious consideration all the existing circumstances, as well as the indirect benefit we would derive from the execution of our plans, and setting aside entirely the idea of an adequate remuneration, according to usage in architectural undertakings, we agreed to receive a salary of $5,000 for our joint services, which we consider barely sufficient to cover our running expenses during the time that our services would be at the exclusive disposal of the Board. For remuneration we looked *entirely to the business which we hope to secure after establishing*, by a conspicuous work, our claim to public patronage.

We imagined this simple salary to be naturally a cash item, and we confess that the inde-

finite postponement of half the pay would put us to serious inconveniences. Neither can we consider it exactly just to make a definite sum payable at an indefinite time.

It appears to us that, if we have to defer our claim, we should also have the chance of its improvement in the mean time. We would, therefore, beg to recur to our former proposal of receiving half our fee in stocks of the company, for though we had a different sum in view when we advanced that proposal, we are nevertheless willing to make the same, with regard to the limited demand we have made. Our confidence in the success of the enterprise is so great, that we gladly take the chance of the rise and fall of the stock. It would then be a matter of our own convenience to decide either upon the time when to dispose of it, or to retain it throughout the period of the exhibition, if, as we think, it should turn out the best possible investment.

We therefore beg to shape our proposal as follows:—

We are willing to receive a salary of $5,000—payable half in cash, and half in stock of the Association for the Exhibition of all Nations in New York.

And in case that the Board should not be disposed to adopt this amendment to the proposal made, we beg to offer still another, which, though not quite so agreeable to us as the payment in stock, would still be less indefinite, than the form in which we have received the question, viz:—We are willing to receive a salary of $5,000, payable half in cash, and half as soon as the receipts of the Exhibition shall amount to 10 per cent. of the cost of the building. We have the honor to be, with high esteem, the Honorable Board's

Most obedient servants,

G. CARSTENSEN & C. GILDEMEISTER.

VIII.

No. 53 Broadway, November 5th, 1852.

Gentlemen,

I wish to call to your serious attention the subject of the delays that are taking place in regard to the execution of the building on Reservoir Square. The very latest day that can be named for the time when the building itself should be finished, is the 15th of March, and we have but little more than four months from now to that period. Our contracts are not all made, our working-drawings are not completed, and not a column is yet erected.

I have no intention at present, more than to direct your attention to this state of things, and the very serious responsibility that will attach to every one of the gentlemen connected with the construction of the edifice, if any delay or omission prevents the opening of the building on the day that we have already notified the world that it would open, viz. the 2d of May.

I feel very sure that, if your minds are called to the deep interest we all have in securing perfect punctuality in respect to the opening of the Exhibition, no possible exertion will be omitted by you to secure this result. I should be glad to be favored with a reply.

I am, Gentlemen,

Respectfully, your obedient,

THEODORE SEDGWICK, *President.*

Messrs. Carstensen & Gildemeister, 74 Broadway.

IX.*

New York, November 9th, 1852.

Sir,

In reply to your esteemed favor of the 5th inst,, we beg leave to give the following explanations.

The delay which has lately manifested itself in regard to the erection of the building on Reservoir Square, is by no means occasioned by any neglect or omission on *our* part.

The working-drawings, specifications, &c., for the principal part of the building have been furnished by us in such good time that the greater part of the ground floor might have been erected before now, if circumstances, completely beyond our control, had not prevented it. We would also, by this time, have completed the remainder of the working drawings, if we had not been so frequently and so considerably interrupted in the execution of our designs, by being summoned to attend to different details; as, for example, the explanation of working-drawings to a vast number of competitors for the iron-work, attendance to the mason-work and digging, to the pattern shop, the supply of numerous copies of every working drawing, for contracts, &c., &c.—many of which items do not properly belong to the architect's sphere. Still we shall yet be able to accomplish, in proper time, whatever can be justly claimed from us, if we are fairly allowed a free and uninterrupted employment of our time and *joint* capacities, according to our best judgment.

We need not add that our interest in securing (as far as it is possible, for our very limited power) strict punctuality in respect to the opening of the Exhibition, must necessarily be as deep as that of any one of the gentlemen connected with the construction of the edifice, since its complete success will, we hope, secure us that reputation and considerable part of the remuneration for our work, which at present is at stake.

We have the honor to be,

Your most obedient servants,

G. CARSTENSEN & C. GILDEMEISTER.

Theod. Sedgwick, Esq., President,

Association for the Exhibition of the Industry of all Nations.

X.

Association for the Exhibition of the Industry of all Nations,

Office, 53 Broadway, New York, November 30th, 1852.

Gentlemen,

Since the conversation which I had recently with you, in pursuance of the resolution passed on the 18th inst., in regard to the delays in the construction of the Building, the Directors of this Association have had the subject again before them, and I am instructed to make you the following communication.

It appears satisfactorily proved to the Board, by your separate admissions, that unnecessary delay has taken place in the preparation of the working-drawings—that this delay has been in greater or less degree continued ever since the letter I addressed you on the 5th inst., and we are moreover convinced, that this delay may possibly prove here-

* At the request of Theodore Sedgwick, Esq., this letter was withdrawn by us, in consequence of his unwillingness to coincide with our wishes.

after of very serious consequence in regard to the completion of the building by the time requisite to enable the Directors to open it on the day for which they stand pledged, viz. the 2d of May.

It is with the utmost surprise and regret that the Directors have come to this conclusion. Your contract with us binds you to furnish the necessary working-drawings forthwith, and it is plain that your undertaking, in this respect, has not been complied with.

But the Board think that they have a right to expect something more from you than a strict adherence to the agreement. You must be aware, by this time, that this Association has much higher objects in view than mere pecuniary success. The selection of your plan for the building, under the circumstances under which it was made, of itself furnishes the strongest evidence, that the great end we have before us is to carry through a novel and difficult undertaking in a manner which shall redound to the credit of all parties concerned. We have already elevated what is, in truth, a mere private enterprise, to the grade of an almost national undertaking; and this has been our aim from the outset.

When your plan was first submitted to us, you were all but total strangers to the members of the Board—one of you just arrived in the country. You had for competitors, architects and mechanics of great reputation and influence, but the Board selected your plan on its own merits, without other recommendation or support, simply because they thought it the best, and because they believed that the beauty and originality of the design furnished proof that you fully appreciated the scheme and purposes of the Association, and gave an earnest of your future devotion to its cause.

It is with deep pain that the Board find themselves mistaken in this just expectation, and it is with great regret that I now address this communication; but there is no alternative. The interest of the stockholders, the claims of the public, and the reputation of the individual members of the Board are not to be overlooked or trifled with; and we are determined to shrink from no steps that the emergencies require.

I am therefore instructed to say, that the Board desire and expect, that all the working drawings yet remaining unfinished, will be completed and furnished to the Engineer with *all possible dispatch*. They do not wish the question of expense to stand for a moment in the way, and they therefore consent to the employment, by you, at their charge, of any additional number of hands necessary to bring on the working-drawings with the utmost possible expedition. They sincerely and earnestly hope that this is the last time they may find themselves compelled to refer to this subject; and that the deep personal interest which you have in this question, will induce you to lose not an instant in the completion of the work.

If, however, unhappily, this should not be the case, and if any *unnecessary* delay in the drawings should hereafter take place, I am further instructed to say, that the Board will not hesitate to assume into their own hands the entire management of the affair, and will proceed at once to select such other architects as they shall see fit to employ.

I am, Gentlemen,

Very respectfully, your obedient,

THEODORE SEDGWICK, *President.*

XI.

NEW YORK, February 22d, 1853.

SIR,

When we undertook the contract for furnishing designs and working-drawings for

the Exhibition Building, we were necessarily unaware, from the magnitude of the structure, the novelty of the mode and material of its construction, of many expenses which, in our progress, we have encountered.

We have found that the terms of the contract were not remunerative, nor such as, with our present experience, we could have entered into; but still we have held ourselves ready and willing to fulfil the engagements we have made, and feel too much pride and interest in the completion of the work, to neglect any effort to do ourselves credit, and to satisfy the Association.

We make the foregoing statement, because we have now received the last instalment on our contract, which we are entitled to, *before* the opening of the exhibition. We do not wish by this, to ask any change of the existing contract, however much the terms of it may give us present inconvenience; but in view of the foregoing facts, we hope that the Association will not find it an unreasonable claim we now make, that of remuneration for the amount of extra work already done, and still to be done, consequent upon alterations and additions to the original plan, and especially on account of the erection of the two-story Arcade between the Reservoir and the main building. For all this additional work we think we are entitled to a remuneration of not less than one thousand dollars, and trust that our claim will meet the approval of the Honorable Board. The receipt of this amount on the 1st of March would be particularly acceptable to us, and relieve us from anxiety, and enable us to devote all our time and abilities to our engagements with you. We hope, therefore, it may meet the views of the Honorable Board, to make payment at that time.

We have the honor to be,

Respectfully, your most obedient servants,

G. CARSTENSEN & C. GILDEMEISTER.

THEOD. SEDGWICK, Esq., President,

ASSOCIATION FOR THE EXHIBITION OF THE INDUSTRY OF ALL NATIONS.

XII.

ASSOCIATION FOR THE EXHIBITION OF THE INDUSTRY OF ALL NATIONS,

OFFICE, 53 BROADWAY, NEW YORK, 24th February, 1853.

Messrs. CARSTENSEN & GILDEMEISTER,

GENTLEMEN,—At a meeting of the Board of Directors of this Association, held this day, it was

Resolved, That there be advanced at once to Messrs. Carstensen & Gildemeister, the sum of one thousand dollars, to be charged to them on account of the fund payable to them, contingently, under their contract with the Association.

I am, very respectfully,

Your obedient servant,

WM. WHETTEN, *Secretary.*

XIII.

No. 53 BROADWAY, 10th March, 1853.

Messrs. CARSTENSEN & GILDEMEISTER,

GENTLEMEN,—A Committee of the Board will attend at your office to-morrow (Friday) between 10 and 12 o'clock.

You will be pleased to have all the working-drawings of the additional building ready for their inspection at that time; and if any of them are out of your office, you will get them together, and have them ready for examination. Respectfully,

THEOD. SEDGWICK, *President.*

XIV.

ASSOCIATION FOR THE EXHIBITION OF THE INDUSTRY OF ALL NATIONS.

OFFICE, No. 53 BROADWAY, NEW YORK, 14th March, 1853.

GENTLEMEN,

I have very sincere pleasure in communicating to you, through Mr. Detmold, Superintending Engineer, the resolution of the Committee appointed to examine into the progress of the Crystal Palace, that a thousand dollars be appropriated for the payment of extra work in your bureau, for the plans, &c., of the additional building; the arrangement as to the order and time of delivery of these, as well as of those not yet finished pertaining to the main building, to be made by Mr. Detmold.

It is hardly necessary to say to you, that the Committee was disappointed to find the building behind its expectations; and, for myself, I must say frankly that in view of the responsibilities that I have assumed, in common with the Directors, and their pledges to the public, which I shall be thought to have adopted, I was not a little startled to see the possibility of my standing before the community as one of the authors of a disappointment that would be spread throughout the entire length and breadth of the country, in whose service I have the honor to be.

Knowing that from your and their antecedents and associations, you and the gentlemen of your department will feel vividly how painfully their apprehension has struck me, I unhesitatingly appeal to you and them, to contribute every effort to avert what would be a deep mortification to us all. And I confidently throw myself upon the sense of honor of all my coadjutors in the enterprise to whose success I have committed myself, to give their whole heart to the work; and to carry to a successful issue—and without break or disappointment in its progress, an undertaking that has become semi-national in its character and scope, and in which the honor of the nation itself is concerned.

I owe it to the gentlemen of your bureau further to say, that the skill and taste of which their work give evidence, showing them to be gentlemen of education and refinement, warrant me in making an appeal to them, that can only be based upon the attribution of qualities responsive to it; and I feel constrained to say this, as a preface to the assurance that I will see that their extra exertions shall be remunerated at the completion of their work.

I am, gentlemen,

Very respectfully yours,

S. F. DUPONT, *General Superintendent.*

Messrs. CARSTENSEN & GILDEMEISTER, Architects, &c., of Crystal Palace.

XV.

To the Honorable Board of Directors of the Association for the Exhibition of the Industry of all Nations.

NEW YORK, April 16th, 1853.

GENTLEMEN,

Up to this time we, as architects of the Crystal Palace, have undertaken with your

liberal sanction, the plan and execution of this great work. No efforts have been spared on our part, to render it acceptable to you, and hence to the public; and consequently, we feel both personal interest and artistic pride in determining, according to our taste and judgment, the final details of decoration, which form an essential part of the building, considered as a whole, as we have already done with those of the building itself, as regards artistic form. Without knowing the actual state of the proceedings of the Board in this matter, we have reason to believe that it is contemplated to employ another artist, and though we but wish the co-operation of such a person, we feel it our duty to explain what we deem to be our right in this matter. In this we will follow the rule and practice everywhere accorded to Architects, similarly situated with ourselves.

We are indifferent as to who executes these decorations, and claim no additional remuneration therefor, but we think ourselves entitled to a voice in determining the style of decoration; for the artistic spirit of the whole edifice must, to be uniform, emanate from one and the same source. We can, therefore, not be content to see others come in at the last moment, and, without any consideration for us, finish that part of the work which makes the strongest appeal to popular admiration or approval. We do not say this for the first time, or with any spirit of presumption, growing out of the fact that we have the work at hand. In the communication which we had the honor to make to the Superintending Engineer, C. E. Detmold, Esq., under date of August 18th, 1852, in answer to an official letter from him, we explicitly defined our position thus:

"If, therefore, the Honorable Board should be pleased to adopt our plans, we could not but wish ourselves to lead the execution, in connection with yourself, as Superintending Engineer and Architect, and controlled by you; in order not only to furnish the requisite working-drawings, &c., but also to have a voice in the manifold details, modifications, alterations, &c., which generally are incumbent upon the Architect, in his capacity of *Superintendent, Decorator, &c., during the progress of the execution of his plan.*"

Now our position so defined, was absolutely confirmed, when our plans were accepted, and it is known that we only agreed to become the Architects on the terms we named, because we were to have the superintendence (of course with the sanction of the Board) of the work even to its final details.

We have such full confidence in your sense of justice, that we deem it unnecessary to dwell upon this point, believing the matter to be so clear as to carry with it entire conviction.

We did not, we may add, willingly show, even to the few persons who saw them, the designs on paper which were executed of the interior, under unfavorable circumstances, and perhaps under misapprehension of the wishes of the Honorable Board; but on this point, we request permission to explain ourselves verbally to the Board, in presence of the Superintending Engineer, C. E. Detmold, whose evidence in points, where we might have been misunderstood, will duly explain our position in this regard. We were too much pressed for time to execute them ourselves as we should have wished, and besides, felt that our ideas on this head could only be duly appreciated by showing the colors on the building itself. We may mention here, that as every arch, moulding, frieze, &c., bears a decorative form, to be further developed by the system of coloring the same, the latter could not be done by others than ourselves without the risk of creating a discordance between the one and the other.

And to do unto others as we would be done by, we would not undertake to finish the work of any Architect, similarly situated with ourselves. If the Honorable Board wishes, we

will send them an exposé of the style we deem appropriate to the decoration, with the cost &c., thereof.

Trusting that this letter may meet the approbation of the Honorable Board,

We have the honor to be,

Their obedient servants,

G. CARSTENSEN & C. GILDEMEISTER.

XVI.

ASSOCIATION FOR THE EXHIBITION OF THE INDUSTRY OF ALL NATIONS,

NEW YORK, 21st April, 1853.

Messrs. CARSTENSEN & GILDEMEISTER, Architects, &c.,

GENTLEMEN,—Your communication of the 16th, on the subject of the decorations, has been submitted to the Board, and in reply, I have to state, that, whilst the Board appreciate and share your desire, that the decorations of the Building should be in creditable harmony with its general architectural style and character of construction, yet they do not admit the position claimed by you, that they are in any wise committed to you for the directions and guidance of the decorations, as your contract of the 26th August, 1852, in their judgment, bears no such construction. Notwithstanding the very serious pecuniary loss, and general disappointment created by the delay of the completion of the Building, largely owing to the late day at which the working-drawings for the most important portions of the building were furnished by you, the opportunity and the means were given you, by the Association, for preparing and submitting designs for the interior decorations. This was done at the earnest request of Mr. Detmold, the Superintending Architect and Engineer, and in recognition of the principle, that the views of the Architects should not be disregarded in the choice of the decorations. But after having waited a full month for those designs, you withheld them, on the ground, as was understood, of their not being satisfactory even to yourselves, nor have we since then received from you any definitely expressed views as to the principles that should govern the interior decorations. Unwilling to leave this question any longer in doubt and uncertainty, the Board have taken the whole subject of decoration into their own hands, and appointed a Committee with power; in doing which they have but exercised the same right and judgment that guided them in the selection of the plan of the building itself. You will perceive, therefore, that the Board cannot concede to your request, to leave the decorations to you, especially as much yet remains to be done in the erection of the Building, which, in accordance with your contract, requires above all your whole service, time, and attention.

I am, gentlemen,

Your very obedient servant,

THEODORE SEDGWICK, *President.*

XVII.

To the Honorable Board of Directors for the Association for the Exhibition of the Industry of all Nations, New York.

GENTLEMEN,

Under the supposition that a calculation of the amount of surface to be painted on the New York Crystal Palace may be acceptable to you, we hereby have the honor to forward

to you the inclosed bill of quantities. In doing so, we beg leave at the same time to repeat our views, with some few modifications, in regard to the decoration of the Building, which have been partially expressed to you, in a letter from the Superintending Engineer and Architect, C. E. Detmold, Esq.

They are as follows:

Outside the building a lively olive bronze color, for panels, columns, arches, girders, cornices, towers, &c. The projecting parts of the mouldings to be kept with a lighter shade, and on some of the receding parts, with a darker shade of the same standard color.

The heads and brackets on the window-arches, ornaments over cornice, tower railings, &c., to be gilt; or painted with a color substituted for gilding.

The window-frames and bars to be painted with a very dark green bronze color, so as to relieve the shade of the glass. A specimen of this mode of decoration has been executed under our direction, on a section towards the north-west part of the building.

The roof of the lean-tos, aisles, nave, and dome, to be painted with copper-green, or lead color. The projecting ribs of the dome to be gilt, or receive a color capable of being substituted for gilding.

All the louvres with a warm straw-color. The outside railings with a greenish bronze color. Lamp posts and lamps relieved with slight gilding, or a substitute for the same.

Inside of the building.—Columns, girders, arches, &c., with a warm yellow color, relieved with stripes of a rich deep blue, and red and white. Base pieces, capitals, brackets, mouldings, and other ornaments painted with positive colors, and gilding according to principles existing for moresque decorations. The construction of the roofs, as standards, braces, rafters, purlins, ribs, tie-rods, trusses, &c., with a deep orange color, relieved, when necessary, with a deep red color. The ceiling of the lean-tos, aisles, nave, and dome to be painted with white, red, and blue colors, on canvas, forming panels between the intersections of the said purlins, rafters, &c. This part of the decoration should be kept very lively and airy, principally on the dome, as the lightness of the construction will not suffer any heavy looking covering. The borders of those panels should not be too broad, or too complicated in their designs, as the first will not look well, and the last will occupy too long a time in executing; a tasteful and noble simplicity should be the general characteristic of the decoration. For this reason, we should object to the under part of the gallery floors being varnished, as they will appear entirely too heavy and dark, in the immediate vicinity of the lively colors of the girders, and lean-to ceilings—a white color with a slight tint of either blue or pink, with deep blue or red stripes on the chamfering of beams, &c., would produce, according to our ideas, a much more harmonizing and finished effect. The railings of galleries, stairs, &c., to be painted white and varnished; the standards, eagles, and rosettes to be relieved with gilding. Also, for a part of this inside decoration a specimen has been executed, under our direction, in a part of the north-west lean-to. In conclusion, we beg leave to add, that the above mentioned style of decoration is kept in accordance with the tinted designs of the outside and inside perspective views of the building, which we had the honor to present to the Board, when we submitted our plan in competition with others; the only modification made being the bronze color for the outside, which we found the necessity of, in perceiving the dark green shade thrown by the glass on the whole building, and which materially deteriorates its general effect.

We have the honor to be, with high esteem,

The Honorable Board's most obedient servants,

G. CARSTENSEN & C. GILDEMEISTER.

New York, May 13th, 1853.

XVIII.

New York, August 3d, 1853.

Dear Sir,

Forced by unforeseen circumstances, we hereby take the liberty of addressing ourselves to you, with regard to the subject of the remuneration promised us, for our designs, &c., of the New York Crystal Palace. We have received from the Association the sum of $4,000, which amount, we regret to say, has not been sufficient to defray our personal expenses, and meet those connected with the execution of our work. It is now nearly twelve months since we were engaged by the Association, and during that time we have entirely devoted ourselves to the completion of the Exhibition Building, and have thus been prevented from accepting or entering into competitions for any other undertaking, which might have proved lucrative to us.

We therefore solicit, that you would kindly represent the matter to the Honorable Board of Directors, and obtain for us their sanction to a final settlement at a definite period, of the $2,000 still due to us, but contingent on conditions stipulated in our contract.

We remain, dear sir,

With high regard,

Your most obedient servants,

G. CARSTENSEN & C. GILDEMEISTER.

Theod. Sedgwick, Esq., President,

Association for the Exhibition of the Industry of all Nations.

XIX.

Association for the Exhibition of the Industry of all Nations,

New York, 6th August, 1853.

Gentlemen,

Your letter in reference to the contingent compensation provided for by your contract was brought before the Board, and I regret to say, that the matter cannot, at present, receive that consideration which it deserves.

I am, gentlemen,

Very respectfully,

Your very obedient,

THEODORE SEDGWICK, *President.*

Messrs. Carstensen & Gildemeister, Architects, &c.

XX.

New York, September 12th, 1835.

Dear Sir,

Your letter of August the 6th, informing us that the matter, respecting the contingent compensation provided for by our contract, was brought before the Board, but could not, at that time, receive the consideration it deserved, has been duly received by us; and, in the hope of obtaining, at a future meeting of the Board, a satisfactory result, we

have until the present moment remained silent. Neither would we now re-appear before you on this same subject, did not circumstances render it absolutely necessary. We have been offered to engage in an enterprise which promises to be of material advantage for us, but the want of means for the preliminary furtherance of our part in this enterprise, forces us most respectfully to appeal to the Honorable Board, for a special consideration of the matter. The actual loss, in pecuniary view, we have sustained by our contract with the Association, chiefly on account of being unable during the time of the erection of the Crystal Palace to attend to any other business, urges us to use every effort in repairing our damage.

We beg, therefore, now in writing, to repeat, what we have verbally stated to you, that we are willing to receive the amount in question in Crystal Palace stocks at nominal value, which mode of meeting our view might perhaps be most convenient to the Board at the present moment.

Hoping that you will excuse our having troubled you again on this subject, and begging your kind action in the premises.

We remain, dear sir,

Very respectfully,

Your obedient servants,

G. CARSTENSEN & C. GILDEMEISTER.

THEOD. SEDGWICK, ESQ., President,

ASSOCIATION FOR THE EXHIBITION OF THE INDUSTRY OF ALL NATIONS.

XXI.

ASSOCIATION FOR THE EXHIBITION OF THE INDUSTRY OF ALL NATIONS,

NEW YORK, September 19th, 1853.

GENTLEMEN,

Your letter of the 12th inst. was read to the Board to-day, and, upon due consideration, it was decided, that your request could not at present be complied with.

Very respectfully,

Your obedient servant,

L. C. STUART, *Acting Secretary.*

Messrs. CARSTENSEN & GILDEMEISTER.

List of Officers

AND OTHERS CONNECTED WITH THE ERECTION OF THE CRYSTAL PALACE, AND THE EXHIBITION OF THE INDUSTRY OF ALL NATIONS.

I.

In the early stages of the enterprise the BOARD OF DIRECTORS consisted of eleven members, who were appointed under the authority granted by the Charter.

President.
THEODORE SEDGWICK.

Vice-President, Treasurer, and Secretary.
WILLIAM WHETTEN.

MORTIMER LIVINGSTON.
ALFRED PELL.
AUGUST BELMONT.
ALEXANDER HAMILTON, JR.
GEORGE L. SCHUYLER.
ELBERT J. ANDERSON.
PHILIP BURROWS.
JOHNSTON LIVINGSTON.
CHARLES W. FOSTER.
THEODORE SEDGWICK,
WILLIAM W. STONE.

L. C. STUART, *Assistant Secretary.*
MAURICE WEHLE, *Bookkeeper.*
FRANCIS HAMILTON, *Clerk.*

DUNCAN, SHERMAN & CO., *Bankers*, N. Y.
CHARLES BUSCHEK, *Sole Authorized European Agent.*
No. 6 Charing Cross, London, and 5 Rue Lafitte, Paris.
G. W. HUGHES, *Special Commissioner to Europe.*

Constructing Department.

GEORGE CARSTENSEN, CHARLES GILDEMEISTER, JULIUS H. KROEHL, } *Architects.*

OSWALD DIEZ,
A. BAUER,
J. KAY,
A. MONTE LILLA,
A. FISHER,
F. STRECKER,
J. PRITZI, } *Assistants in the Architects' Department.*

Building Department.

C. E. DETMOLD, *Superintending Engineer.*
HORATIO ALLEN, *Consulting Engineer.*
EDMUND HURRY, *Consulting Architect.*
JULIUS KROEHL, *Assistant Engineer.*
THOMAS H. FARREN, *Superintendent of Machine Arcade.*
G. W. STANTON, *Superintendent at Reservoir Square.*
HENRY M. VAUGHAN, *Weighmaster, and in charge of Office at Reservoir Square.*
EDWARD CLARK, *Engineer's Clerk.*
E. LEAVENWORTH, F. CARSTENSEN, } *Secretaries to the Building Committee.*

Surveyors.

RICHARD AMMERMAN, N. Y.
P. H. DREYER, N. Y.

Contractors

For the erection of the Crystal Palace, and the supplying of all materials used therein.

Masonry.

LORENZO MOSES, N. Y. STEWART & SMITH, N. Y
M. B. OSBORN, N. Y.

Riggers, and Raisers of the Building.

NOE & MARSHALL, N. Y.

Cast and Wrought Iron Work.

HOGG & DELAMATER, N. Y.
STILLMAN, ALLEN & CO., N. Y.
MOTT & AYRES, N. Y.
JAMES L. JACKSON, N. Y.
L. COLWELL & CO., N. Y.

ROACH & JOHNSON, N. Y.
D. D. BADGER & CO., N. Y.
BUCKUP & PUGH, N. Y.
F. S. CLAXTON, N. Y.
JAMES RITCHIE, Williamsburg, N. Y.
TUTTLE & BAILEY, Williamsburgh, N. Y.
MATTEAWAN MACHINE AND MANUFACTURING CO., Fishkill, N. Y.
DANIEL R. BARHYTE, Fishkill, N. Y.
W. H. BARHYTE, Fishkill, N. Y.
STANTON & MALLORY, Newburgh, N. Y.
SLATER & STEELE, Jersey City, N. J.
A. D. BERRY, Rockaway, N. J.
JAMES R. TEMPLIN, Easton, Pa.
JAMES R. & R. B. TEMPLIN, Easton, Pa.
BETTS, PUSEY, JONES & SEAL, Wilmington, Del.
MILLER & WILLIAMSON, Westport, Conn.
J. W. WATERFIELD & CO.
BENEDICT & DUNN.
AYRES & TAYLOR, N. Y.
FREDERICK B. FLAGLER.
A. J. COFFIN & CO.
UNION POWER CO., of U. S.
S. CLARK.

Bolts, and Blacksmith's Work.

V. H. FOX (late Fox & Oothout).
SAMUEL HALL, N. Y.
BOSTON BOLT CO., Boston, Mass.
DENNIS DOLIN.

Stairs.

J. B. WICKERSHAM, N. Y.
M. H. HOWELL, N. Y.

Railing.

J. B. WICKERSHAM, New York City.

Carpenters.

JAMES OWENS, N. Y.
G. L. HAVEMEYER, N. Y.
DAVENPORT, FERRIS & LATHAM, Camptown, N. J.
DAVENPORT & FERRIS, Greenpoint, L. I.

Roofers and Tinners.

EDWARD CROMMELIN, N. Y.
LEWIS & LOWEREE, N. Y.
P. MANNY, Williamsburgh, L. I.

Glaziers and Glass Manufacturers.

COOPER & BELCHER, Camptown, N. J.
E. W. VOORHEES, N. Y.
MOORES & LITTLE, N. Y.
RICHARDS & BROTHERS, N. Y.
MATTHEW KANE, N. Y.
A. ROLKER MOLLMANN & A. PERIER, N. Y.

Pile-Driving for Foundations.

JAMES M. FERGUSON, N. Y.

Plumbing, Water Pipes, and Sewerage.

NATHANIEL SAWYER, N. Y.

Gas Fixtures.

JOHN JOHNSON & BROTHER, N. Y.

Painters and Decorators.

HORATIO GREENOUGH, of Cambridge, Mass., *Superintendent of Painting and Decoration.*
A. MONTE LILLA, *Designer and Painter of Interior of Dome and Ceiling*, N. Y.
W. G. WINGHAM, *Overseer of Painters*, N. Y.

Zinc Mouldings.

JOSEPH J. GILBERT & SEELIG, N. Y.

II.

The first Annual Election for Directors was held on the 7th March, 1853, and the previous Directors were elected. Subsequently an amendment to the Charter authorized the appointment of fourteen additional Directors, and under this authority the following Gentlemen were added to the Board

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JACOB A. WESTERVELT.	WATTS SHERMAN.
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WM. WHETTEN.

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CAPT. C. H. DAVIS, U. S. N., *Associate do.*

On the resignation of Capts. Du Pont and Davis, John M. Batchelder was appointed Acting Superintendent

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SAMUEL WEBBER, *Arrangement of Space and Classification.*
PROF. B. SILLIMAN, Jr., *Mineralogy and Chemistry.*
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EDWARD VINCENT, *Textile Fabrics.*
FELIX PIATTI, *Sculpture.*

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WM. C. H. WADDELL.	WM. KENT.
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JAMES A. HAMILTON.	F. W. EDMONDS.

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III.

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IV.

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At the second Annual Election, held on the 6th March, 1854, the following Gentlemen were chosen Directors:

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WILLIAM O'BRIEN.
EDWARD HAIGHT.
JOHN T. FARISH.
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P. F. BARNUM, *Secretary and Treasurer's Office.*
G. H. BENEDICT, " " " "
F. G. WOOD, *Clerk.*

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GEORGE CARSTENSEN, *Associate do.*
A. VANDEN HEUVEL, *Clerk.*

S. BREVOORT, *Invoice Office.*
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W. B. LEONARD, *Director of Machinery.*
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M. BRUNEMAIRE, *French* "
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S. E. BELMONT, *Austrian* "
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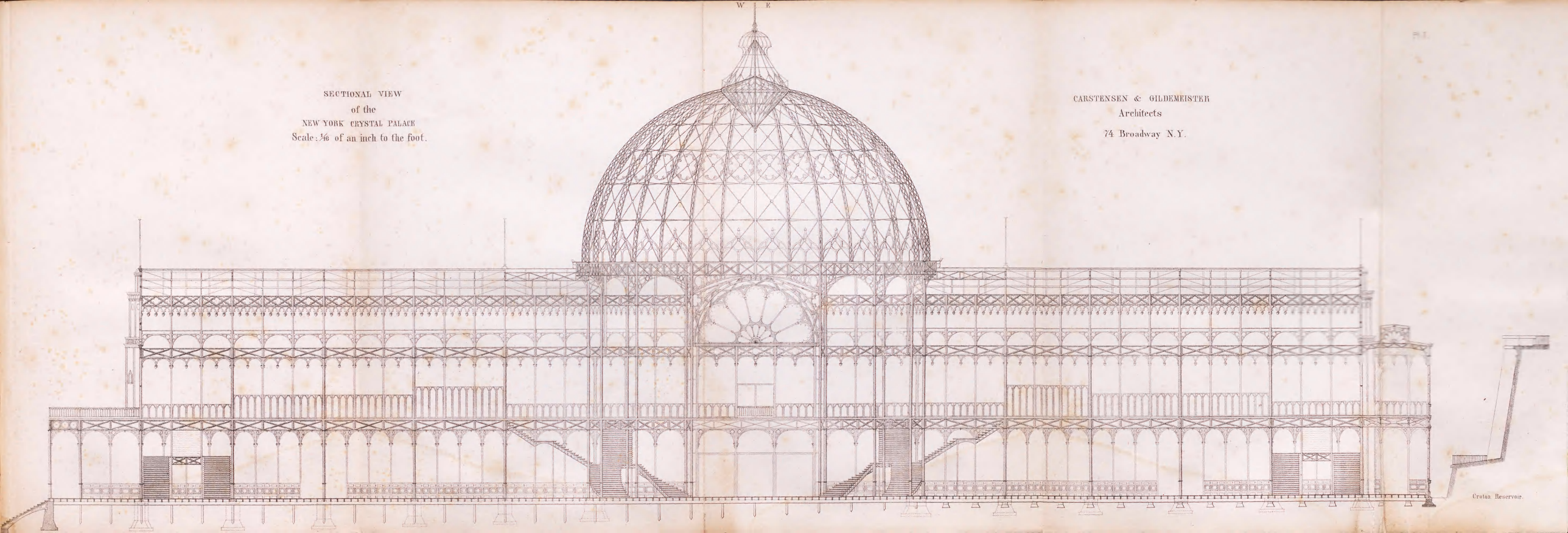

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Scale for Fig. 12, 13, 14: 1 inch to the foot.
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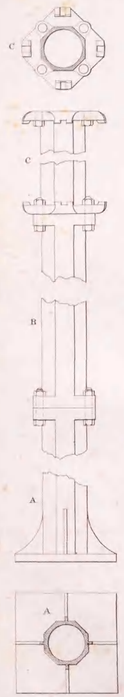
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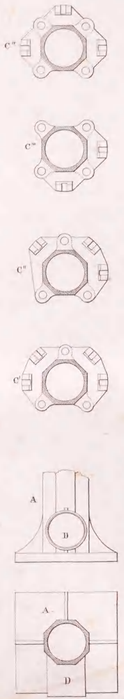
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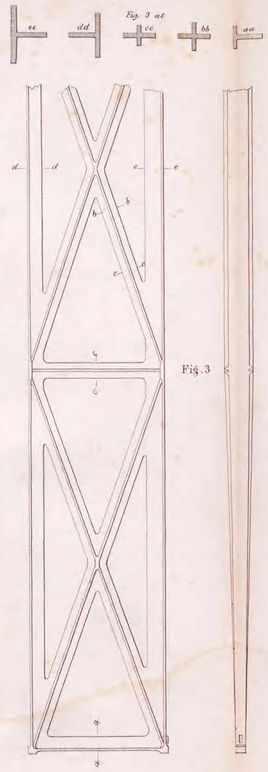
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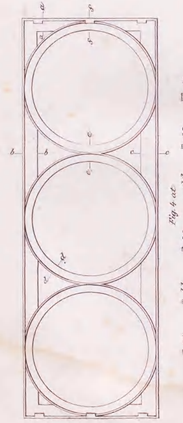
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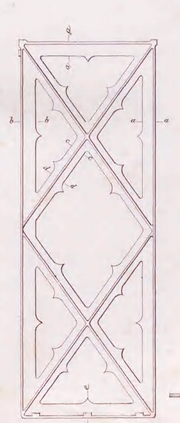
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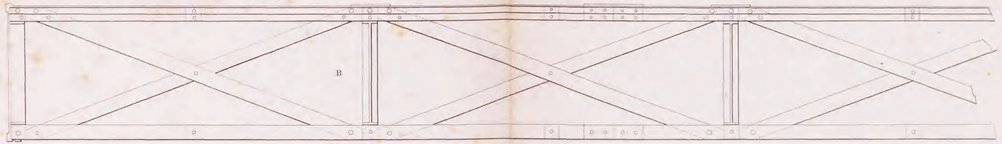
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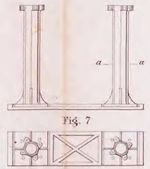
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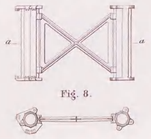
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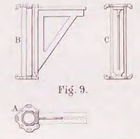
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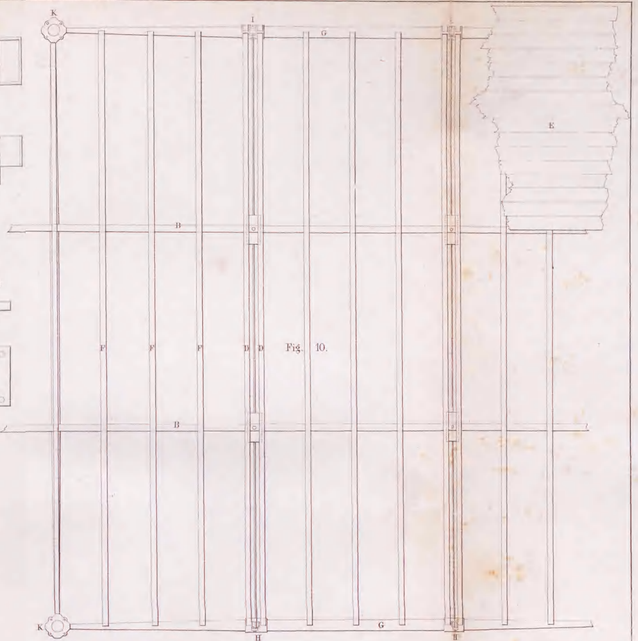
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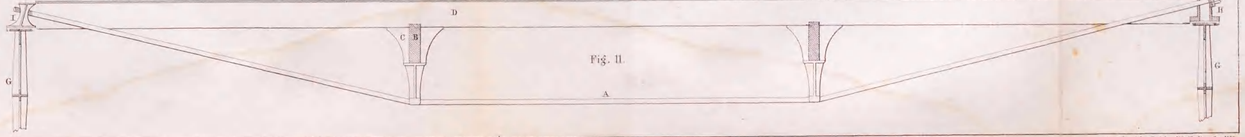
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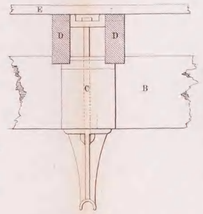
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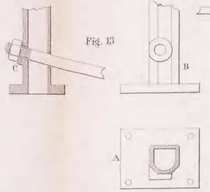
Fig. 13


Fig. 14

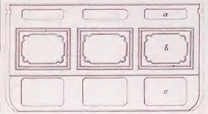
Fig. 15


Fig. 16


Fig. 17

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Scale for Fig. 1. 9, 15, 16, 17, 18, 19, 20, 21. ¼ of an inch to the foot. Scale for Fig. 2, 3, 4. ⅛ of an inch to the foot. Scale for Fig. 10, 11, 12, 13. 1½ of an inch to the foot.
Scale for Fig. 5, 6, 7. ⅛ of an inch to the foot. Scale for Fig. 8, 9. ¾ of an inch to the foot.
Scale for Section Fig 16. 1 inch to the foot

Fig. 1.

Fig. 2.

Fig. 3

Fig. 4

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Fig. 20

Fig. 21

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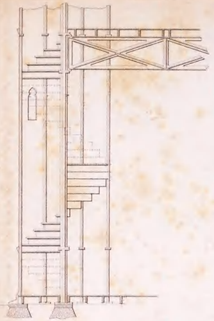
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Fig. 2

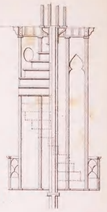


Fig. 3

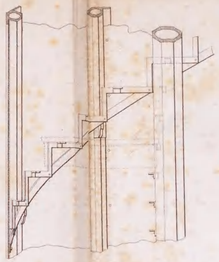

Fig. 4


Fig. 8


Fig. 9


Fig. 7


Fig. 10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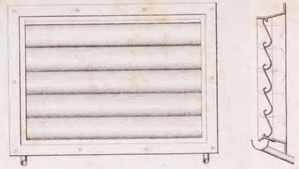


Fig. 12


Fig. 13

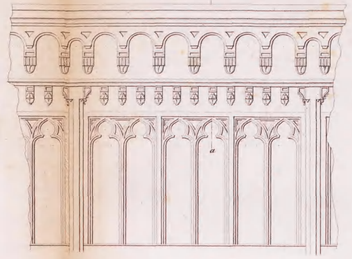
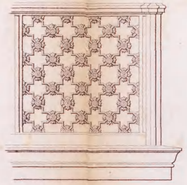


Fig. 14


Fig. 15


Fig. 18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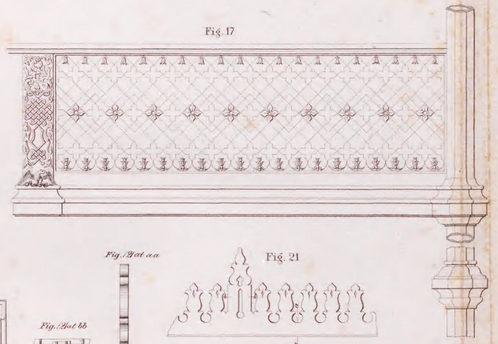
Fig. 17


Fig. 19

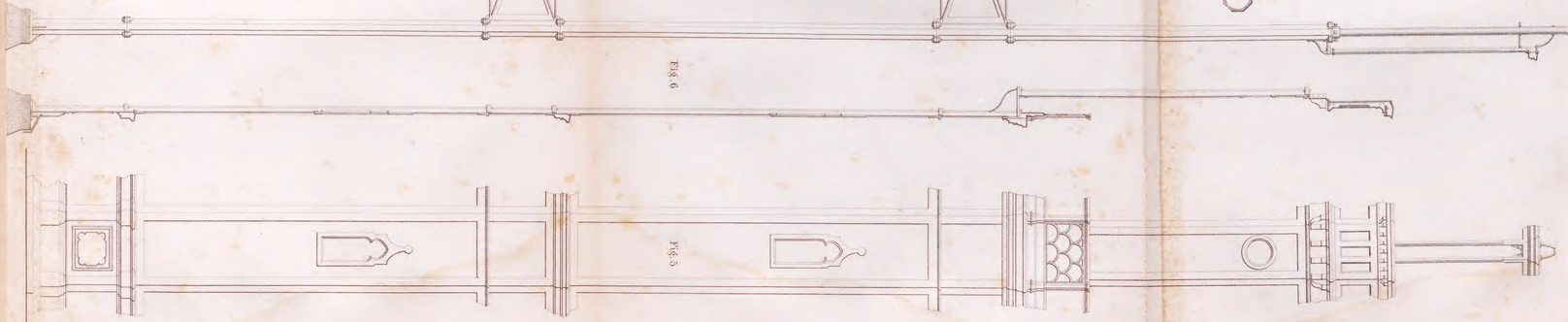
Fig. 5

Fig. 6


Fig. 23


Fig. 24 bb

Fig. 24 aa

Fig. 21


Fig. 22


Fig. 20

Scale: Fig. 1, 2, 3, 4. 1/8 of an inch to the foot.
" " 5, 6, 14, 20, 23. 1/4 of an inch to the foot.
" " 7, 8, 9, 10, 11, 15, 16, 17, 18, 19, 21, 22. 1/2 of an inch to the foot.
" " 12, 13 and for Sections at Fig. 24. 1 inch to the Foot.

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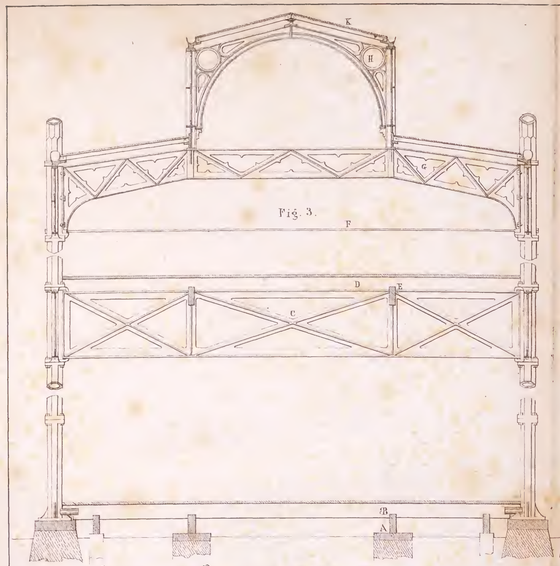
Scale for Figs 1, 2, ½ of an inch to the foot.
Scale for Figs 3, 4, 5, 6, 8, 18, 19, 20. ¼ of an inch to the foot.
Scale for Figs 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, ½ of an inch to the foot.
Scale for Sections at Fig 4, 7. 1 inch to the foot.



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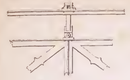
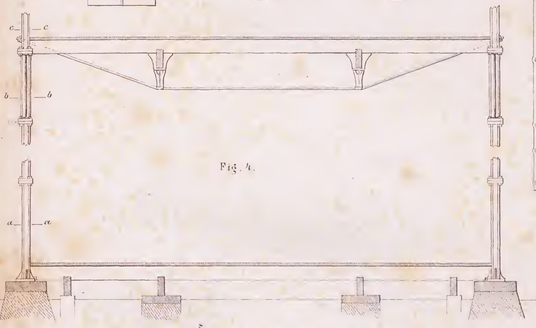


Fig 3 at a a


Fig. 5


Fig 6

Fig h at



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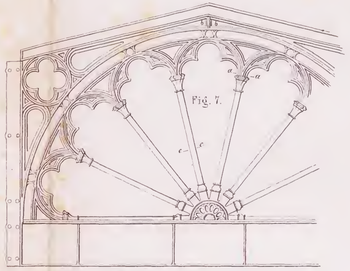
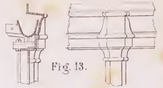


Fig. 7.

Fig. 7 at


Fig. 11.


Fig. 12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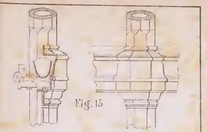
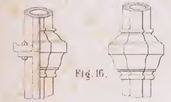


Fig. 15


Fig. 14.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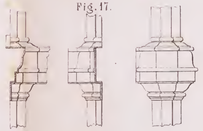
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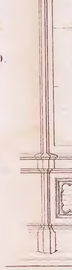
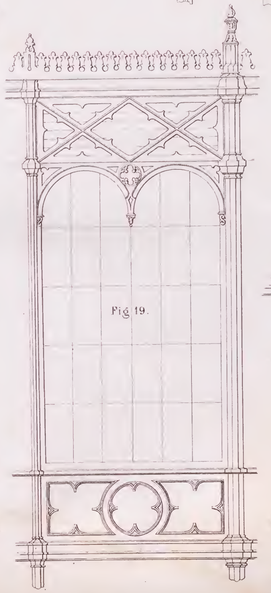


Fig. 9.


Fig. 10.

Fig. 18.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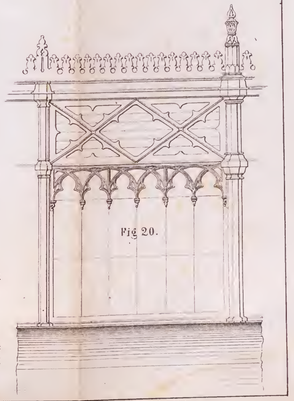
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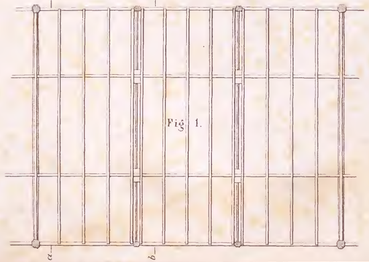
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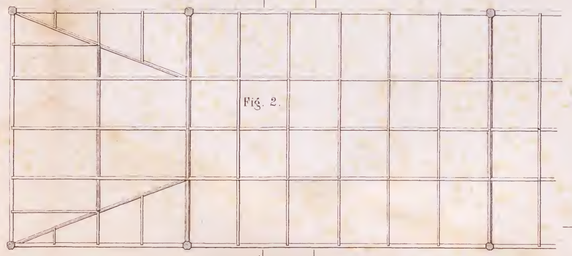
Fig. 2.

Fig. 8.

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OF

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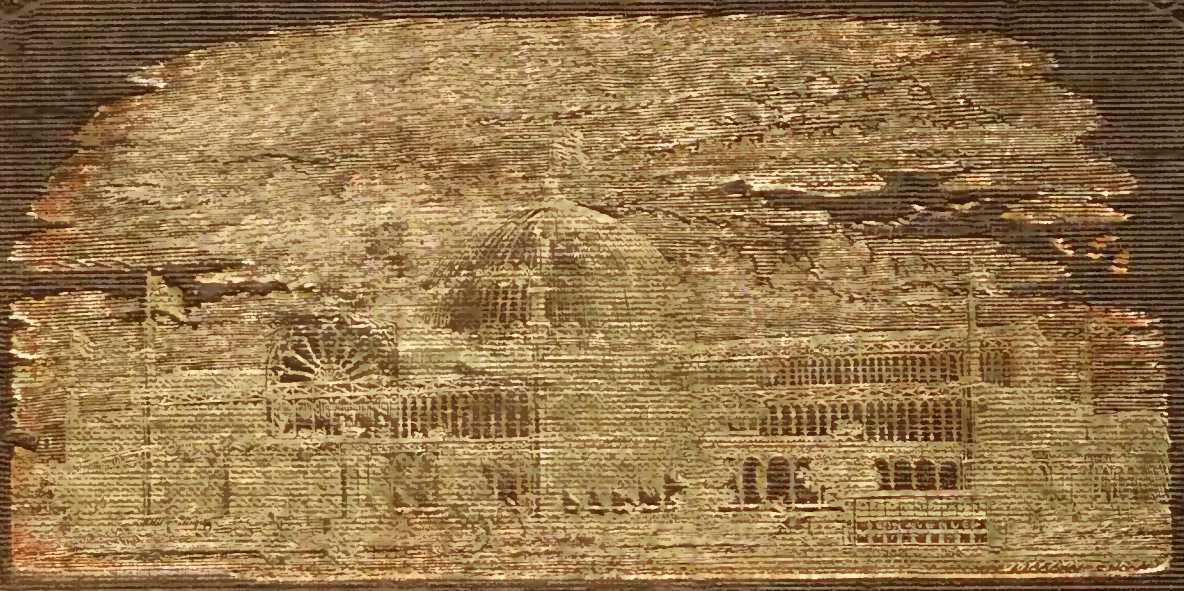

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REGINALD HERBERT KENDALL

ARCHITECT OF THE BUILDING